

# MACHINE TOOL BLUE BOOK

## PRIMARY ARITHMETIC

Review Problem No. 4  
4 Hacksaws broke when  
50% worn out.

4 Hacksaws broke when  
75% worn out.

4 Hacksaws completely  
wore out.  
How much more cutting  
would have been done  
with 12 Hacksaws  
that did not break  
and completely  
wore out?

$$\begin{array}{rcl} 12 \text{ blades} @ 100\% \text{ efficiency} & = & 1200\% \\ 4 \text{ blades} @ 50\% \text{ efficiency} & = & 200\% \\ 4 \text{ blades} @ 75\% & " & = 300\% \\ 4 \text{ blades} @ 100\% & " & = 400\% \\ \hline & & 900\% \end{array}$$
$$\frac{900\%}{1200\%} = \frac{3}{4}$$

Ans. 12 blades that did  
not break\* did  
 $\frac{1}{3}$  more work

\*Hackmasters

ARE UNBREAKABLE  
MOLYBDENUM HIGH SPEED  
STEEL HAND  
BLADES



AMERICAN  
SAW & MFG. CO.

SPRINGFIELD 1, MASSACHUSETTS

# Capacity . . .

With this battery of twelve No. 6A and No. 9A MARVEL High Speed Automatic Hack Saws, the Hammond & Irving Forge Co. of Auburn, New York can cut-off billets automatically, not only in tremendous numbers, but in accurate weights and sizes to exactly fill each die without waste. With 12 of the "world's fastest cutting-off saws" they were able to keep all 1000 workers running on their tremendous war orders, and were able to instantly resume peacetime manufacturing without re-tooling or other delay. The No. 6A and No. 9A MARVEL Automatics have capacities of 6" x 6" and 10" x 10" respectively.

In addition to the battery of MARVEL Automatics, Hammond & Irving have cutting-off capacity of a different sort in their MARVEL No. 18 Hydraulic Hack Saw—capacity for size because this roll-stroke giant cuts off billets and bars in sizes to 18" x 18" cross section. It easily handles the toughest and hardest steels.

## ARMSTRONG-BLUM MFG. CO.

*"The Hack Saw People"*

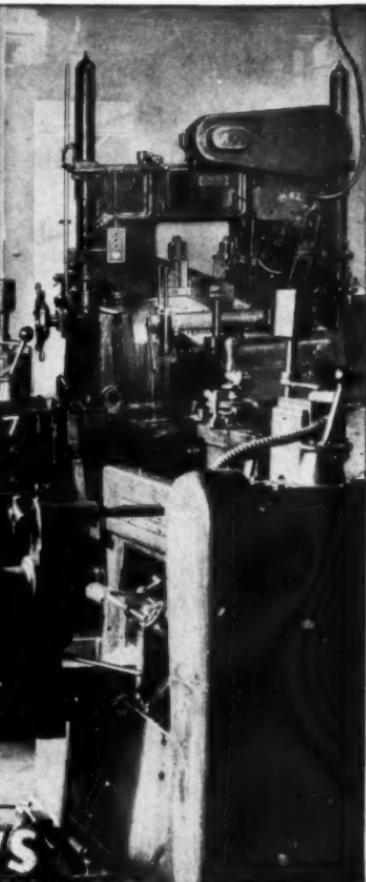
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# MARVEL SAWS

**MARVEL 18**  
for Size,  
**MARVEL 6A and 9A**  
for Volume Production





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Hobart Arc Welders are easy to operate while producing high quality welds faster with greater profit—that's what many users have been telling us for years! Two major Hobart operation features—the Remote Control that saves needless steps, and the Dual Control that offers 1000 combinations of welding heat—are mainly responsible for the production of high quality welds at greater speed. Dependability is another Hobart strong point. Liberally designed and conservatively rated, your Hobart Welder will give more years of reliable service. Models are available in various capacities in Electric Drive, Gasoline Drive and A. C. Arc Welders. Check the coupon for further details. **Hobart Brothers Company, Box**

**TB-86 Troy, Ohio, "One of the World's  
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Shows you how to re-design your product with practical arc welding ideas to save labor and material costs. Large, easily understood illustrations. Three different volumes available. \$3.50 per volume, \$10 for set of 3.



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*arc welders*

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copy of  Gasoline Drive

Electric Drive  Gasoline  
S. enclosed for \_\_\_\_ vols. "Practical Design for Air  
Cooled Gasoline Engines" by W. H. Dugay

110

2324

### ADDRESS

# PRODUCTION



# Accessories to Lower COSTS

## THREAD TOOL

Mounts on any screw cutting lathe and replaces single point thread tools and chasers. Indexing system presents each of ten cutter teeth successively to the work allowing maximum cuts to produce a perfectly formed thread. Duplicates threads without gauging. Write for Bulletin 110.

## LOCKJAW

New all purpose work clamp eliminates expensive bolting operations on millers, planers, grinders and drills. Stops work heaving, shimmying, yawing and buckling with sure-grip, locking pressure forward and downward. Write for Bulletin 140.

## COLLETS

Lathe, milling machines and other tools can readily be equipped to use Rivett draw-in collets and step chucks. This self-centering, convenient method of chucking reduces time and increases precision on tool-room and production work. Write for Bulletin 100.

# RIVETT

# RIVETT LATHE & GRINDER, Inc.

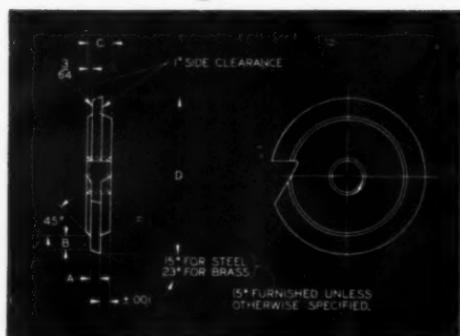
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MACHINE NUMBER	TOOL NUMBER	MAXIMUM STOCK SIZE	A	B	C	D	PRICE EACH
00	60C-011	3/16"	.031"	.180"	1/4"	1.750"	\$ 4.50
00	60C-046	3/16"	.046"	.235"	1/4"	1.750"	4.50
00	60F-011	3/8"	.031"	.187"	1/4"	1.750"	4.50
00	60F-046	3/8"	.046"	.197"	1/4"	1.750"	4.50
00	60F-062	3/8"	.062"	.187"	1/4"	1.750"	4.50
00	60X-062	1/2"	.062"	.280"	1/4"	1.750"	4.50
00	60X-078	1/2"	.078"	.380"	1/4"	1.750"	4.50
00	60X-093	1/2"	.093"	.390"	1/4"	1.750"	4.50
0	8C-081	2 1/8"	.081"	.187"	5/16"	2.250"	\$ 8.00
0	8C-078	1 1/8"	.078"	.280"	5/16"	2.250"	5.00
0	8F-062	5/8"	.062"	.332"	5/16"	2.250"	5.00
0	8F-078	5/8"	.078"	.332"	5/16"	2.250"	5.00
0	8F-093	5/8"	.093"	.332"	5/16"	2.250"	5.00
2	2C-062	3/8"	.062"	.187"	3/8"	2.000"	\$ 8.00
2	2C-078	1 1/2"	.078"	.280"	3/8"	2.000"	8.00
2	2C-093	3/8"	.093"	.332"	3/8"	2.000"	8.00
2	2F-062	1"	.062"	.319"	3/8"	2.000"	8.00
2	2F-078	1"	.078"	.319"	3/8"	2.000"	8.00
2	2F-093	1"	.093"	.319"	3/8"	2.000"	8.00
2	2T-078	1"	.125"	.319"	3/8"	2.000"	8.00
2	2T-113	1"	.125"	.319"	3/8"	2.000"	8.00
2	2T-156	1"	.166"	.318"	3/8"	2.000"	8.00

*Each tool is individually packaged*



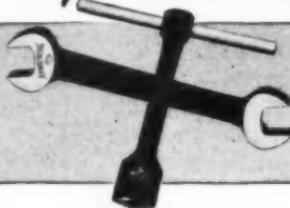
WRITE FOR  
 BULLETIN F

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PERFORMANCE HAS ESTABLISHED LEADERSHIP FOR HARDINGE

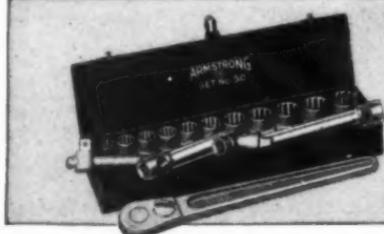
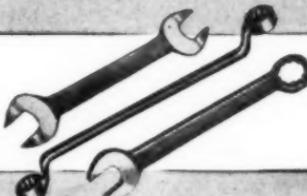
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Armstrong Drop Forged Carbon Steel Wrenches including 19 Different Types.

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# Machine Tool Blue Book

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AUGUST 1946

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## NO. 5 THE PUZZLE OF THE VANISHING DOLLAR?



Get this! Three gents put up at a hotel, paying \$30 rent in advance. Shortly afterward the clerk discovers that he has overcharged them \$5, so he sends that amount back by the bellhop. But the bellhop, a weak character, returns only \$3. Now the men have paid \$27 and the bellhop has \$2 — making a total of \$29. What became of the extra dollar?

And a very appropriate little problem, too. For many's the dollar that's vanishing, these days, in seemingly simple operations.

Metal turning costs are a problem. The chances are that turning accounts for 25 per cent or more of all machining time in your plant.

There are cases in our files of savings of hundreds of dollars a month in the manufacture of a single part by the use of Jones & Lamson machines. Our machines are designed specifically for the most efficient use of carbide tools which can remove metal 200 to 500 per cent faster. We have solved many tough cost problems. Solving them is our business.

Be skeptical of the production efficiency of all metal turning equipment in your plant.

Telephone or write for a Jones & Lamson engineer who will be glad to consult with you on all phases of your metal turning problems.



### JONES & LAMSON

MACHINE COMPANY  
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Manufacturer of: Universal Turret Lathes • Fay Automatic Lathes •  
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# *A new Milling.*

## THE NO. 2 MI



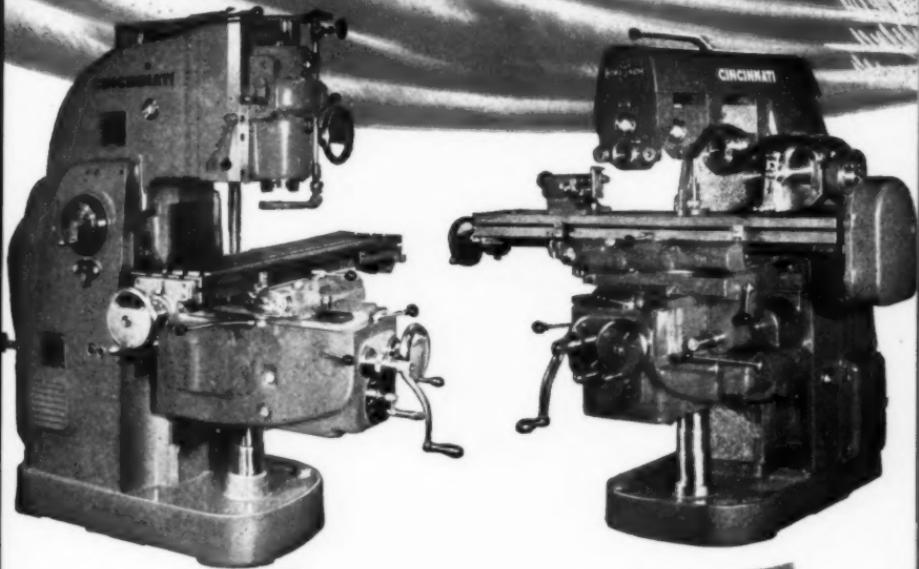
**CINCINNATI**  
No. 2 MI Plain  
Milling Machine



The development and building of machines that will handle machining operations to better advantage has always been the paramount aim of Cincinnati Milling. And while this end result is necessary to offset rising costs, the machine tool itself must have more than features of rapid output; it must also gain operator acceptance. The new CINCINNATI No. 2 MI Milling Machines fulfill both of these requirements. They offer many new features for today's production, and they have features of safety and dependability which quickly win operator acceptance. If you would keep abreast of the accelerating business tempo, investigate the possibilities offered by the new CINCINNATI No. 2 MI. These new machines are available in Plain, Universal and Vertical styles. Complete engineering specifications may be obtained by writing for catalog M-1429-1.

# Machine

BY CINCINNATI



CINCINNATI  
No. 2 MI Vertical  
Milling Machine

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CINCINNATI 9, OHIO, U. S. A.

MILLING MACHINES

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August, 1946

MACHINE TOOL BLUE BOOK

**The CONE AUTOMATIC MACHINE COMPANY**  
  
**sees many  
 GOOD THINGS AHEAD**

***It is reported that . . . . .***

The Railroad Research Bureau of U. S. Steel Corporation has designed an all-welded steel coal car that eliminates 15% of dead weight.

*get ready with CONE for tomorrow*

B. F. Goodrich announces a new "white carbon black" which will permit the making of white and colored tires.

*get ready with CONE for tomorrow*

A new oven developed by Vendo Company of Kansas City cooks with steam pressure.

*get ready with CONE for tomorrow*

"Sinsteel G," developed by American Electro Metal Company, is a duplex metal made by impregnating porous, sintered steel with copper. Because of its copper content, it can be brazed.

*get ready with CONE for tomorrow*

Lockheed Aircraft Corporation is testing its "Speedpak," a streamlined metal container that fastens to the underside of an airliner and holds four tons of cargo.

*get ready with CONE for tomorrow*

Westinghouse has patents on a new fluorescent lamp that resembles an incandescent bulb and uses arsenic in place of mercury.

*get ready with CONE for tomorrow*

Du Pont is developing a method of porcelain enameling aluminum.

*get ready with CONE for tomorrow*

A 2-horsepower electric motor, weighing only fifteen pounds, is made by Electrical Engineering & Manufacturing Corporation.

Myles Plastics Corporation of New York claims to have methods and compounds by which small, simple plastic parts can be molded cold at rates of 25,000 per hour or better.

*get ready with CONE for tomorrow*

Chestnut trees, the chief source of leather tanning agents, are threatened by blight, but Monsanto chemists are working on a synthetic tan to take its place.

*get ready with CONE for tomorrow*

The new semi-automatic machines of General Tire and Rubber Company can turn out a tire every two minutes, which is about twice the usual output.

A vacuum-draft oil burning furnace that does not require the conventional type of chimney was shown by the Norge Division of Borg-Warner Corporation at the Oil Heat Exposition.

*get ready with CONE for tomorrow*

Cranberry Canners Inc. of Cape Cod will test a mechanical cranberry picker this fall. It is expected to increase the yield per acre and double the rate of harvesting.

*get ready with CONE for tomorrow*

The United States Patent Office is sorting and evaluating 10 tons of Nazi patents brought here from Germany.

*get ready with CONE for tomorrow*

Great deposits of bauxite have been located in Oregon, conveniently near the hydroelectric plants of the Pacific Northwest, by the Oregon State Department of Geology and Mineral Resources.

## *Another good TURN*



*for You*

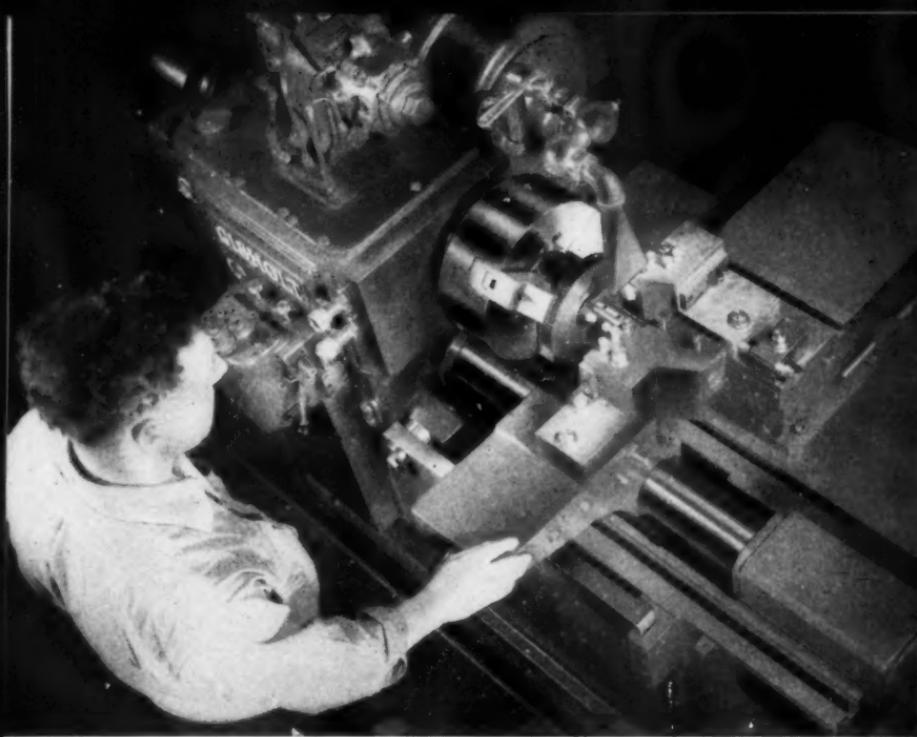
This 9 1/4" wrench handle is made of SAE 4130 1/2" round stock. Twelve operations are completed within the tolerances specified in 55 seconds. The Conomatic, an innovation in the B-spline field, has led in the handling of work hitherto thought impractical including pieces up to 25 1/2" in length.

*Ask your CONE representative to show you our new color motion picture*

# CONE

AUTOMATIC MACHINE CO., INC. • WOODBROOK, VERMONT, U.S.A.





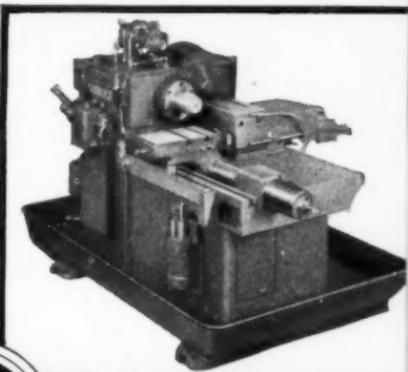
## MIDDLE-OF-LIMITS ACCURACY . . . *year after year with* **THE GISHOLT HYDRAULIC AUTOMATIC LATHE**

You won't have the usual loss of accuracy caused by wearing parts—even after years of service—with this modern automatic lathe—for here are no complicated mechanisms to wear. Its simplicity reduces moving or mechanical parts to a very minimum.

All parts having to do with tool movement are completely surrounded by oil and lubricated under pressure. Both carriages move on hardened and ground steel surfaces. For all practical purposes, there is no wear out. Further, since both front and rear tool slides feed against and dwell at positive dead stops, utmost accuracy in finished dimensions is insured.

With this advanced automatic lathe, you can count upon middle-of-limits performance for years on end. Moreover, you can count upon trouble-free operation that cuts maintenance bills to the vanishing point! Write for complete information.

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*THE GISHOLT HYDRAULIC AUTOMATIC LATHE provides a 12" swing over front carriage. Although it is a heavy, rugged machine, it is also well suited for light, fast jobs.*

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# Hourly on *Federal* RESISTANCE WELDERS

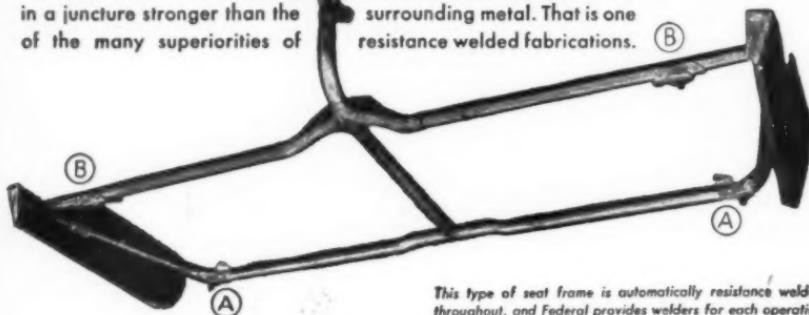
THE FEDERAL Resistance Welding pictured here happens to be the assembling of studded brackets to a sliding seat frame, but the principle involved may well apply to some production of yours...the principle of getting the best possible juncture between two or more pieces of metal at the lowest possible cost.

In this case two Federal PA-2 press type welders are used as one projection welding unit. They are mounted on a single steel base for solid alignment, and synchronized with electronic controls to operate in unison. The dies are simple. Air-lift cylinders provide extra wide die opening for easy loading.

Brackets are dropped in each of the lower dies (A-A and B-B). The frame is then quickly positioned in dies A-A (no locking necessary). Seconds later, two brackets having become a part of the frame, the work is indexed in the direction of the dotted line and two more brackets welded (in dies B-B). Job is done in less than 30 seconds floor to floor, delivering 150 frames (600 brackets with 2400 welds) per hour.

These brackets are not merely "fastened" to the frame. They are a part of it, because resistance welding literally forges the two parts in a juncture stronger than the of the many superiorities of

surrounding metal. That is one resistance welded fabrications. (B)



This type of seat frame is automatically resistance welded throughout, and Federal provides welders for each operation . . . flash welding the tubular members, flash welding the Y-bracket and spot welding stampings to the frame.

## THE *Federal*

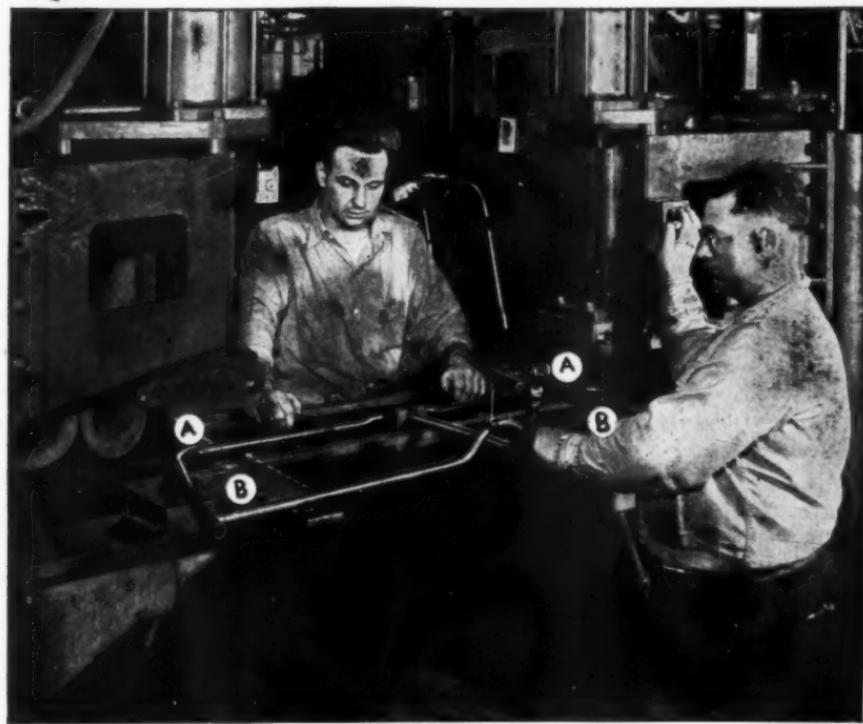
## MACHINE

SUBSIDIARIES

Sumner and Adams Co., Cleveland—SPECIAL HIGH PRECISION MACHINES  
The Warren City Mfg. Co., Warren—WARCO PRESSES and PRESS BRAKES



# 2400 Welds\* AUTOMATIC



\* These are projection welds, four projections being stamped into each bracket. Thus eight welds (two complete brackets) are made during each cycle of this combination unit.

Bulletin 4520 describes Federal Press Type Welders. Bulletin SP-346 describes all types of Federal welders.

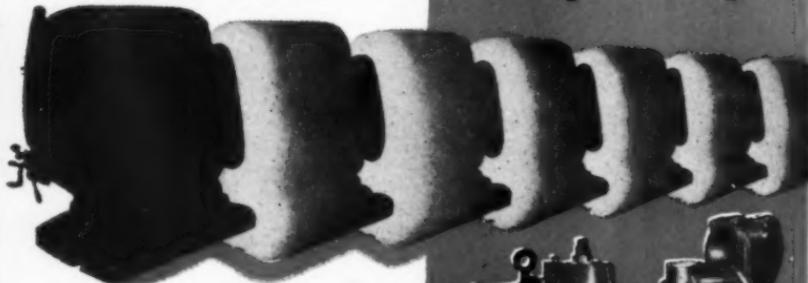
AND WELDER COMPANY

216 DANA STREET

• WARREN, OHIO



# Multiply YOUR MILLING MACHINE Job Capacity



Do you want to increase the productivity of your standard milling machines? Then consider the application of Kempsmith standard attachments. These dependable, precision-built tools are made to perform the most delicate milling operations with both speed and accuracy. They are the product of 57 years' specialized experience, manufacturing milling machines exclusively. The same high degree of rigidity and precision, characteristic of Kempsmith Milling Machines, is embodied in these standard attachments. It will pay you to investigate. Write for literature.

**THE KEMPSMITH MACHINE CO.**

MILWAUKEE 14, WIS., U. S. A.



#### KEMPSMITH-Standard Milling Attachments

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- 3 CIRCULAR TABLE for milling circles or spirals, gear cutting, high-speed continuous milling, etc.
- 4 SLOTTER for keyseating, broaching, gear, slotting, tool and die making, etc.
- 5 VISSES, both plain and swivel types, adaptable to special jaws to save fixtures.
- 6 UNIVERSAL DIVIDING HEAD for plain indexing and spiral milling.

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**Jarvis "Hy-speed" Rotary Files:** The recognized standard in thousands of manufacturing and machine tool plants. Furnished with Jarvis Hy-speed Case, increasing the life of the tool three times or better under average conditions.

**Jarvis "Tungsten Carbide" Rotary Files:** The hardest, fastest Rotary File ever put into a flexible shaft machine! When the original cost of these tungsten carbide tools is spread over extremely long-life operation and subsequent regridings, your rotary file costs drop to a fraction of those incurred with the use of ordinary high speed steel files.

*Send For Our Recent Catalogs*

**THE CHARLES L. JARVIS CO., MIDDLETOWN, CONN.**  
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QUICK CHANGE CHUCKS AND COLETS

Air Tool  
Threads  
8000 HOLES  
Without  
Breaking  
A Tap



This outstanding achievement results from several factors. The operator has complete and instant control of the Ingersoll-Rand air-powered Size 1TM Tapping Machine. Reversing the tapper is accomplished instantly without stopping the motor. A light downward pressure on the handle engages the right-hand gearing and drives the tap into the hole—a light pull back on the handle engages the left-hand gearing to back the tap out of the hole.

The air motor also permits starting the tap at slow speed, then increasing to maximum allowable speed for completion of the operation.

A special jig to hold the tapper was built by the customer. This keeps the machine at right angles to the work and speeds up repetitive operations.

*The advantages of the air tool, combined with the jig, produced 8000 holes with clean, straight threads without breaking a tap.*

You, too, may enjoy the benefits of Air Tools—Call our nearest office—one of our sales engineers will gladly assist you in selecting the proper air tools for your jobs.

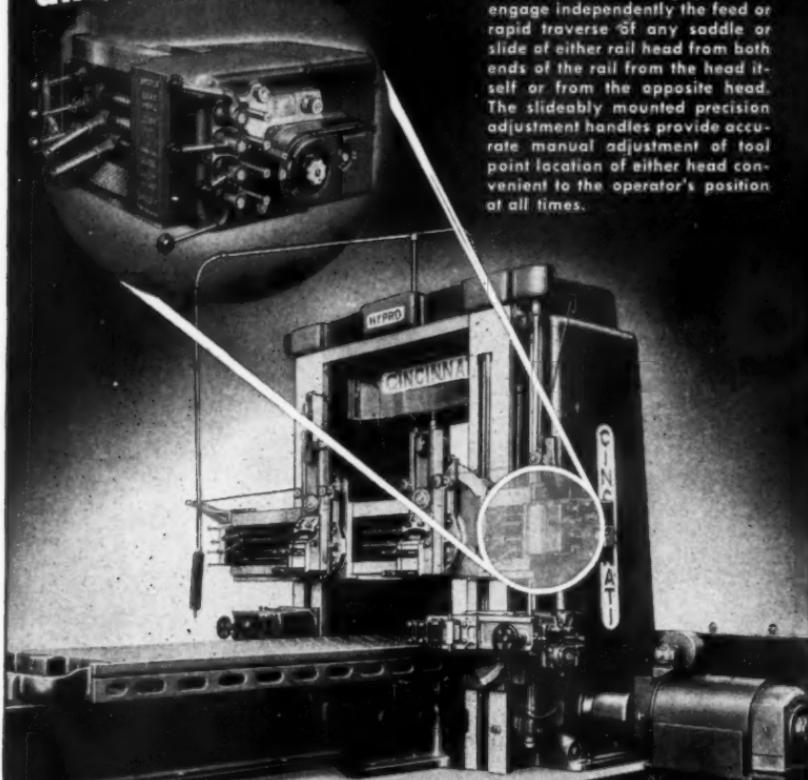
SEVENTY-FIFTH ANNIVERSARY

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slide of either rail head from both  
ends of the rail from the head it-  
self or from the opposite head.  
The slideably mounted precision  
adjustment handles provide accu-  
rate manual adjustment of tool  
point location of either head con-  
venient to the operator's position  
at all times.

**THE CINCINNATI HYPRO PLANER COMPANY**  
PLANERS - BORING MILLS - PLANER TYPE MILLERS  
CINCINNATI, OHIO

# The "LONG and SHORT" of It

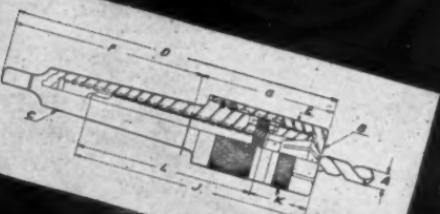
Scully-Jones "Feed as you Need" Chucks

Illustrations show how  
time, drill is  
used for all  
drill,ream  
drilling

WITH Scully "Feed as you Need" Chucks, you can chuck short or long series drills with only a small portion of the drill extending—thus keeping overhang at a minimum. The drill always has a positive backing against slipping into the chuck.

You need only half as many drills when you use Long-Series Drills for Short-Series work. The saving in Time and Tools is apparent.

The drill is adjusted for depth or overhang without releasing the chuck by simply loosening the Collet lock nut and twisting the drive collar.



Tool Number	To Accommodate Inclusive Drill Sizes	Collet No	M. T. Shank	Overall length	Body diameter	Shank depth	Depth Drill enters Chuck Total when completely drawn in Extended					Price Each
							A	B	C	D	E	
NA-1	5/16 to 11/64	A	1	4 1/4	1 1/8	2 7/16	1 15/16	2 11/16	15/16	1 1/8	1 1/8	19.94
NB-2	9/32 "	B	2	5	1 1/8	2 1/8	10/16	2 1/16	3 5/8	7/8	2 1/2	24.63
NC-3	3/16 " 13/32	C	3	6 9/16	1 1/2	3 11/16	2 7/16	4 7/16	1 1/8	3 1/2	3 1/2	30.50
ND-4	5/16 " 9/16	D	4	7 7/16	1 1/2	4 7/8	3 5/16	5 1/2	1 1/8	3 1/2	3 1/2	38.71

FURTHER INFORMATION AND QUOTATIONS ON REQUEST



Collet Number	For Drill Sizes	Price Each
A	57 TO 11/64	\$2.64
B	1/8 " 9/32	3.58
C	3/16 " 13/32	5.28
D	5/16 " 9/16	7.04

Refer to the Scully-Jones Catalog showing over 300 types and sizes of cutting tools, collet chucks, boring equipment, centers, etc.

**Scully-Jones**  
AND COMPANY

3914 SOUTH ROCKWELL STREET • CHICAGO 8, U.S.A.

# *American*

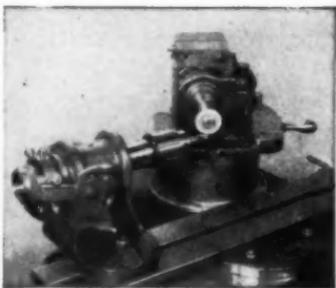
## 22 ALUMINOX FOR CENTERLESS AND CYLINDRICAL GRINDING

Whether it's grinding .140" alloy steel rod or massive rolls of steel or cast iron, "American" 22 Aluminox Grinding Wheels hold their shape, cut cool and fast . . . maintain top production from every machine. Available in all popular sizes up to 30". Let us know your requirements.

AMERICAN EMERY  
WHEEL WORKS  
7 RICHMOND SQUARE, PROVIDENCE 1, R. I.

*Axial Relief*

## GRINDING FIXTURE



Set-up for  
flute grinding

**One Fixture  
Does the Work  
of Several**

**N**O longer is it necessary to invest in a different grinding fixture for each individual grinding job. The Axial Relief Grinding Fixture does away with this needless expense by enabling you to grind cutting edges, steps, flutes and chip relief—all with a single fixture.

Just the thing for grinding milling cutters, burring tools, counterbores, countersinks, end mills, reamers, drills and taps. Can be used on both surface grinders and cutter grinders.

Send for literature explaining simplicity of operation and illustrating typical applications.

**WRITE FOR  
Literature**

**GOVRO-NELSON CO.**  
1933 Antoinette  
Detroit 8, Mich.

This job "couldn't be done"—

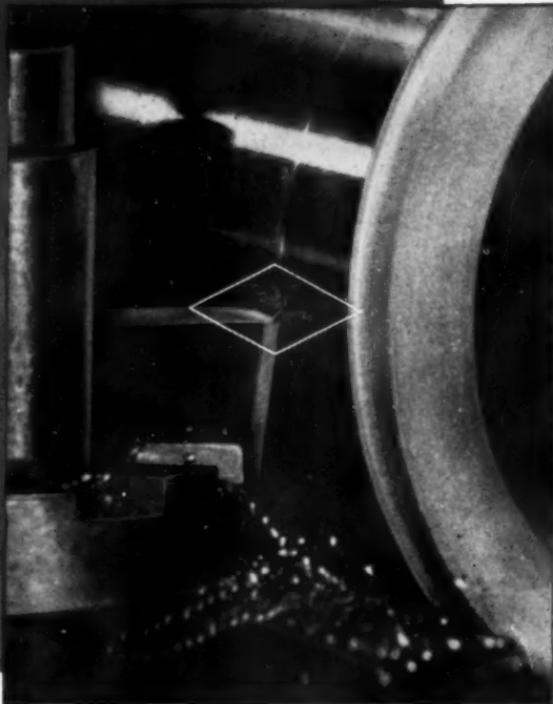
but **FIRTHITE** did it!

**CONDITIONS**

- Depth of cut..... $\frac{1}{16}$ " to  $\frac{1}{8}$ "
- Feed per revolution..... 0.015"
- Cutting speed..... 800 feet per minute
- Firthite Grade used..... T-16

The parts on this job of turning silicon electrical sheet laminated rotors were not machineable with ordinary cutting materials, and required grinding.

Firthite sintered carbide was the answer. It finished the parts accurately and smoothly (no grinding needed), and produced 75 rotors between tool changes.



If you have a

cutting problem—

Call **Firth-Sterling**  
**STEEL COMPANY**

Offices: McKeesport Pa., New York Hartford Philadelphia Pittsburgh Cleveland Dayton Detroit Chicago Los Angeles

# SHAVE "Per Piece" COSTS

with the new

**Enco** **HEXTURRET**

*Self-Indexing*

—the better bed turret



It's easy to cut lathe time on every operation. Enco's Hexturret has the accuracy, rigidity and speed to step up output and thereby reduce unit costs . . . This versatile bed turret provides a wide range of uses—including drilling, counterboring, spotfacing, threading and many other operations. New DOUBLE BED CLAMP prevents crawling under heavy cuts . . . Unique DOUBLE DRIVE assures quick, easy slide movement. Only ENCO offers as many features. Adapt every bench lathe in your shop to a DUAL PURPOSE, DUAL PRODUCTION machine. Write today for complete details.

Department 18



#### ENCO'S "DOUBLE-DRIVE" PRINCIPLE



Push a block with one finger. Pressure on an edge pushes the block to one side. The same is true with a single drive and one gib . . . friction and wear are created. Enco's double drive equalizes power and prevents uneven wear.

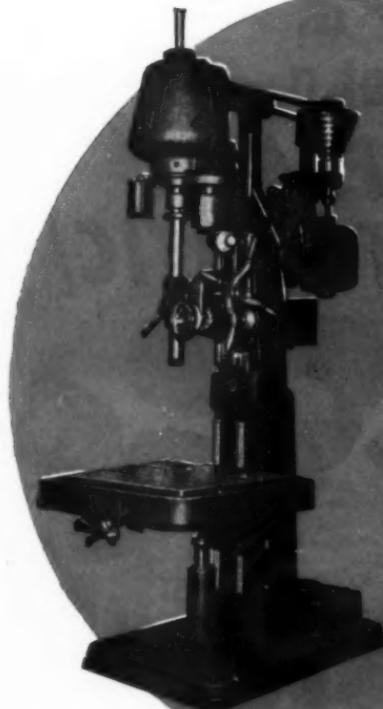
**ENCO MANUFACTURING COMPANY**

GENERAL OFFICE AND FACTORY: 4522-24 FULLERTON AVE., DEPT. 18, CHICAGO 39, ILL.

EXPORT DIVISION: ENGINEERING BUILDING

205 W. Wacker Drive

# CANEDY-OTTO



Single Spindle  
Model . . . also  
available with  
2 to 6 spindles.

## BOX COLUMN

21" SLIDING HEAD

## FLOOR DRILL

*Precision Built*

Here is a line of drills . . . in single and multiple spindle models . . . which are specifically designed to perform accurate work at low cost and minimum maintenance. All surfaces are hand scraped, bored holes are in perfect alignment. Few operating wrenches are required as all necessary tools are integral parts of the machine.

### Specifications

Drill, capacity in cast iron with back gear . . . . .	1½"
Drill, capacity in cast iron less back gear . . . . .	1"
Distance between center of spindle and gib . . . . .	10½"
Min. distance between spindle nose and table . . . . .	0"
Max. distance between spindle nose and table . . . . .	22"
Diameter of spindle . . . . .	1½"
Spindle travel with power feed . . . . .	9½"
Spindle travel less power feed . . . . .	10"
Diameter of spindle quill . . . . .	2½"
Diameter of spindle nose . . . . .	2½"
Table travel . . . . .	22"
Distance between spindles and tables . . . . .	22"

Additional specifications and data sent on request. Send today for fact-crammed, well illustrated folder No. 100A . . . no obligation.



**CANEDY-OTTO**  
**MANUFACTURING CO.**  
**CHICAGO HEIGHTS, ILLINOIS**  
*Manufacturers of Drilling Equipment Since 1892*



To Make Such Parts  
at Low Cost  
Get a

# **CLEVELAND AUTOMATIC!**



To Learn About

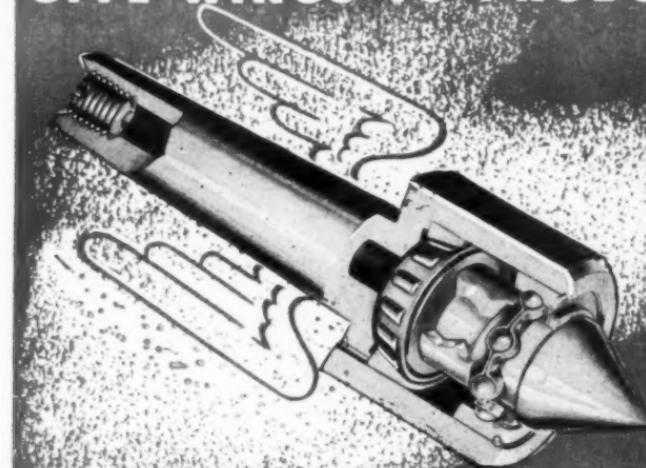
*Clevelands Get Bulletin AB*

**THE CLEVELAND AUTOMATIC MACHINE CO.**

2277 Ashland Road • CLEVELAND 3, OHIO

BRANCHES: Chicago • Detroit • New York • Cincinnati • Hartford

# GIVE WINGS TO PRODUCTION



## IDEAL "Multi-Duty" LIVE CENTERS

Speed up machine output by making it possible to turn heavier loads, take deeper cuts, at higher speeds.

A real precision tool that assures accurate turning. Has precision bearings—both, ball bearings for radial load, tapered roller bearings for thrust load.

4 Inserts for holding centered and uncentered work are quickly interchangeable. Save set-up time! A further help in cutting machinery costs.

### New IDEAL Heavy Duty LIVE CENTERS

For Those Larger Turning Jobs—  
Accurate to .0005".

For Complete Information Write for FREE  
Machine Tool Catalog.

Machinery Products Division

## IDEAL INDUSTRIES, Inc.

(Successor to Ideal Communicator Dresser Co.)

1541 1542 1543

SYRACUSE, N.Y.

Designed for Machine Shop Use

## IDEAL MACHINE SHOP ETCHER

Electrically writes on smooth-surfaced iron, steel and their alloys. Permanently marks reamers, drills, dies, etc. . . . 14 Heats.



Other IDEAL Accessories include: Lathe and Magnetic Chucks, Demagnetizers, Grinding Wheel Dressers, Dust Collectors, Granite Surface Plates, and the Most Complete Line of Markers and Etchers on the market.

*Prompt Delivery*

1538

Sales offices in Principal Cities — Consult your local telephone book — In Canada: Irving Smith Ltd., Montreal, Quebec.



# LUCIFER

## ELECTRIC HEAT TREATING FURNACES

### SPECIFICATIONS

- Interior size—Model 7051— $5\frac{1}{2}'' \times 5\frac{1}{2}'' \times 6''$
- Exterior size— $15'' \times 15'' \times 17''$
- Operation—110 V. A.C. only
- Rating—1.2 K. W.
- Ship. Wt.—Approx. 85 lbs.
- Operating cost—Approx. 3¢ per hr.

PRICE \$112.00 f.o.b. Factory, Philadelphia

### SPECIFICATIONS

- Interior size—Model 7053— $8'' \times 8'' \times 10''$
- Exterior size— $18'' \times 20'' \times 24''$
- Operation—110 V. A.C. or 220 V. A.C.
- Rating—3 K. W.
- Ship. Wt.—Approx. 225 lbs.
- Operating cost—Approx. 6 to 8¢ per hr.

PRICE \$188.00 f.o.b. Factory, Philadelphia

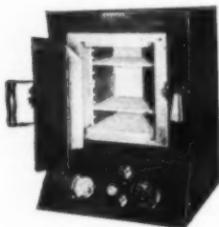
### WITH AUTOMATIC HEAT CONTROL

Just what you have been waiting for. Electric heat treating furnaces that are easily operated; you can do your own heat treating — harden and temper dies, punches, gauges, jigs and fixture parts, normalize weldings and castings. It's easy with a "LUCIFER" because it has the "LUCIFER" automatic electric heat control that permits stepless control of any predetermined heat within its range up to 2000° F. All "LUCIFER" furnaces are equipped with indicating built in pyrometers calibrated both in Fahrenheit and Centigrade, pilot light, control switches and automatic control devices. You can now equip your old Furnace with a Lucifer Automatic Heat Control unit 110 or 220 V. A.C. up to 5 K.W., from \$27.50 to \$41.50 complete. We can also supply a 7 day Control, which will turn your furnace on in the morning and off at night, shut off at noon Saturday, skip Sunday and repeat each 7 days. \$27.50 complete. All prices are F.O.B. factory Philadelphia, Pa.

### SPECIFICATIONS

- Interior size—Model 7052— $12'' \times 12'' \times 10''$
- Exterior size— $22'' \times 22'' \times 24''$
- Operation—220 V. A.C.
- Rating—4.8 K. W.
- Ship. Wt.—Approx. 350 lbs.
- Operating cost—Approx. 10 to 14¢ per hr.

PRICE \$260.00, f.o.b. Factory, Philadelphia



### DISTRIBUTORS

New York—Connecticut—Northern Jersey  
Lafayette Tool & Supply Co.  
128 Lafayette St., New York 13, N. Y.

Rhode Island—Massachusetts  
H. Leach Machinery Co.,  
387 Charles St., Providence 4, R. I.

### DEALERS:

Write for our interesting offer to qualified distributors.  
Desirable territories open.



California  
Reagan Company,  
6409 Santa Fe Ave., Huntington Park, Calif.

Minnesota  
Satterlee Company  
118 Washington St. North,  
Minneapolis 1, Minn.

Eastern Pennsylvania—Southern New Jersey  
Wilson Steel & Tool Co.,  
Commercial Trust Bldg., Philadelphia 2, Pa.

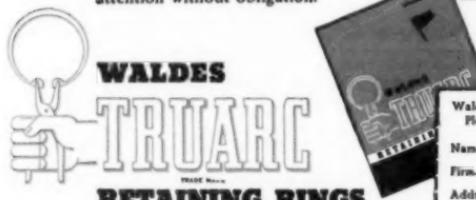
### SOLE SELLING AGENT . . .

**GILBERT S. SIMONSKI**  
401 N. BROAD ST., PHILADELPHIA 8, PA.

# New Ball Bushing is prefabricated for fastening with Waldes Truarc Retaining Rings



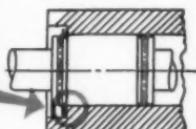
Whether your product is still on the board or has been in use for years, there's a Waldes Truarc Retaining Ring that will make it simpler, more economical to make and repair. Truarc Rings conform to NAS standards, give a never-failing grip. Truarc's constant circularity is assured by its patented tapered design. Truarc engineers can guide you, help you, make suggestions. We'll give your particular problem individual attention without obligation.



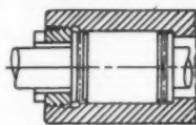
WALDES KOHINOOR INC., LONG ISLAND CITY 1, NEW YORK  
VISIT TRUARC BOOTH @ Instrumentation-for-Tomorrow Exhibit @ HOTEL WILLIAM PENN, PITTSBURGH @ SEPT. 16-20

## WHICH OF THESE FOUR WAYS WOULD YOU USE TO HOLD BALL BUSHINGS?

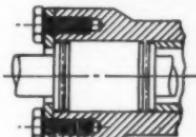
Thomson Industries, Inc., Long Island City, promotes customer satisfaction by determining the most efficient method of installing the Ball Bushing—pre-grooves for Waldes Truarc Rings. Why? The reasons are obvious on this page.



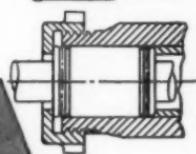
1 Compare the compact simplicity of this Truarc application with the designs below. See how Truarc cuts costs.



2 You could use a collar like this, with its extra material, tapping, threading and additional assembly time.



3 You could fasten it with bolts—look at the extra material and machining in the housing; see how it complicates assembly.



4 You could retain it with a heavy external collar—extra material and labor, more time on the assembly line.

Waldes Kohinoor, Inc., Long Island City 1, N. Y., Dept. 238  
Please send Free Booklet on Truarc Retaining Rings to

Name & Title _____
Firm _____
Address _____
City _____ Zone _____ State _____

# BAYFLEX...a new Bay State development

## THE AMAZINGLY SAFER CUT-OFF WHEEL

The New Bayflex Wheels, incorporating cotton fibres in abrasive bonding, are Bay State's answer to the demand for cut-off wheels that combine greater safety with faster, freer cutting action and minimize the operator's fear of wheel breakage.

Greater safety results from the increased toughness and balanced flexibility of an entirely new bonding material. And in addition to providing fast cutting, this balanced flexibility permits side grinding and close following of contours with the danger of wheel

breakage greatly reduced — an amazingly safer wheel.

Already, in many foundries and other metal-working plants, these advanced wheels are setting new performance records in cutting-off non-ferrous metals. Write for recommendations on how the new safe-operating, time-saving Bayflex Wheels can benefit your production.

**BAY STATE ABRASIVE PRODUCTS CO.**

29 Union Street, Westboro, Mass.



## ABRASIVE PRODUCTS

Top Performance Consistently Duplicated



GRINDING WHEELS



AND POINTS



HONING AND SUPERFINISHING STONES



CUT-OFF WHEELS



INSERTED-NUT DISCS

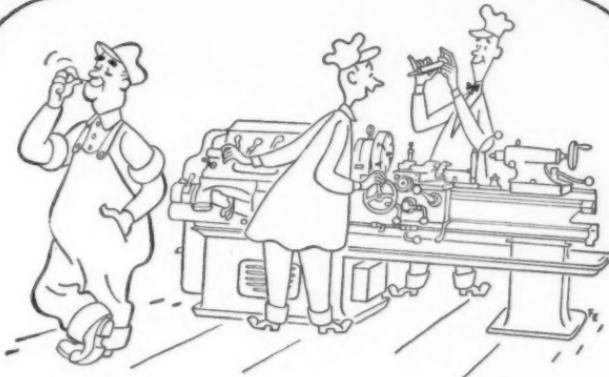


PORTABLE SNAGGING WHEELS



AND CYLINDERS





## *The Story of the Bull with the Greenhorns*

Once upon a time greenhorns got in the Old Bull's hair, but those trying times can be banished forever. Ask any Old Timer who has Hendey Precision Tool Room Lathes in his department. He'll tell you it's a pleasure to run them—they're easy to operate—they produce such fine work—they're ideal for training greenhorns.

There are sound reasons for this—reasons for which Hendey engineers and designers are responsible. Their forward thinking and functional designing—their particular attention to critical construction features combine to make Hendey Precision Tool Room Lathes simple to operate, absolutely chatter-free, exceptionally accurate, fast and economical producers.

You may not be the Old Bull in your shop, but if you are interested in speeding the training of greenhorns, plus improving tool room work and reducing costs, you should write to Hendey today.

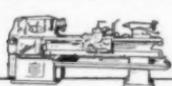
The Hendey Machine Company

*Main Office and Plant* — Torrington, Connecticut

*Branch Offices* — New York, Chicago, Boston, Detroit, and Rochester  
*Representatives in* — Phila., Cleveland, Los Angeles, Pittsburgh, San Francisco

TOOL ROOM LATHES

12"-14"-16"-18"-20"-24"



SHAPERS

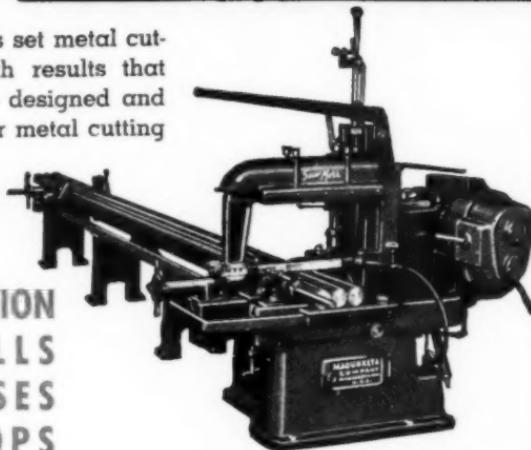
12"-16"-20"

IMMEDIATE DELIVERY

*Sawmore*  
METAL CUTTING MACHINES

Sawmore Machines set metal cutting standards with results that count, for they are designed and built to reduce your metal cutting costs . . . to save you time . . . to increase your production.

FOR PRODUCTION  
STEEL MILLS  
WAREHOUSES  
FORGE SHOPS



These outstanding features demonstrate  
Sawmore's superiority and leadership.

- (a) Fully automatic! Set-up time 2-minutes, after which little or no attention is required.
- (b) Saves floor space! Machines may be placed closed to wall or aisle, for angular cuts are made by swiveling machine on base up to 45°.
- (c) Precision accuracy! Sawmore's exclusive self-aligning bearings mean perfect rigidity and alignment of the blade producing a much finer degree of cutting accuracy.
- (d) Transmission! Four-speed, gear box transmission . . . with speeds approximately 65, 93, 120, 149 strokes per minute. Gears in constant mesh, operate in oil. Shifting by single lever control. Can be furnished with V-Belt.

**MAQUOKETA COMPANY**  
MAQUOKETA, IOWA

# Economical • Efficient • Accurate



## AN OLIVER DIEMAKING MACHINE

IN EVERY  
TOOLROOM

### ABOVE . . .

Heavy Duty . . . Saws, files, laps tool steel up to 3" thick. Permits sawing to center of 20" circle. Table 14" square tilts 15° to right, left and front . . . Strokes 0" to 5" with speeds from 100 to 300.

Extremely fast on sawing, filing and lapping operations the Oliver of Adrian Die Making Machine cuts direct labor cost 50% to 60% in making dies, gages, templates and cams.

### BELow . . .

Bench type S-1 is direct motor driven, connected to pinion shaft through an improved universal coupling. Saws, files, laps tool steel up to 1" thick . . . Saws to center of 17" circle. 10" square table tilts 10° right, left and forward.



Don't Neglect  
Your Toolroom  
It's the Backbone  
of Production!

## OLIVER INSTRUMENT CO.

1408 E. Maumee St., Adrian, Mich.

Write for Illustrated Literature.

# Oliver

OF ADRIAN

AUTOMATIC DRILL GRINDERS — TOOL  
AND CUTTER GRINDERS — DRILL  
POINT THINNERS — TEMPLATE  
TOOL GRINDERS — FACE MILL  
GRINDERS — DIEMAKING MACHINES



## COOLANT PUMPS

*Because You'll Have to Make  
Present Machine Tools Do Still Longer*

### ... install FULFLO COOLANT PUMPS to keep work cool

ALL signs point to your equipment being forced to stay on the job longer than expected . . . installing a dependable centrifugal coolant pump is economical and practical.

*FULFLO keeps work cool and helps maintain greater uniformity, closer tolerances and better finishes.*

Standard or special models; pipe sizes  $\frac{3}{8}$ " to  $1\frac{1}{2}$ ". Motor, direct or belt drives. Chips or grit cannot interfere; spring tension packing; automatic adjustment; no bearings or other parts to wear out.

*Write on your letterhead for the  
FULFLO MECHANICAL DATA BOOK*

• • •

Also — ask about Fulflo By-Pass,  
Oil-Relief Valves



THE



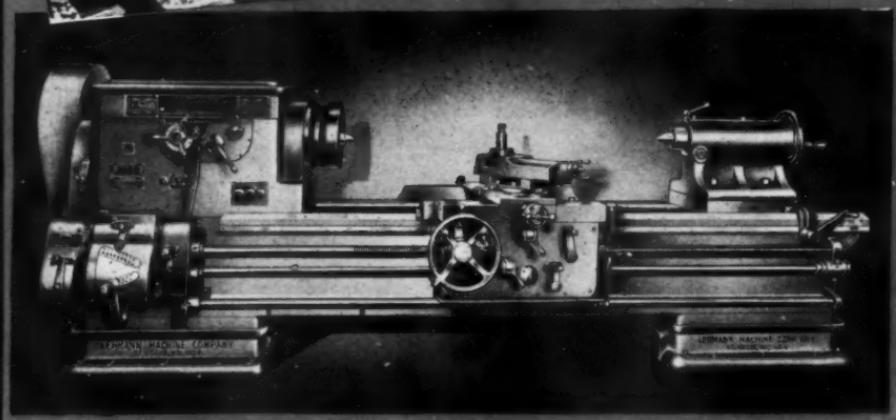
TRADE MARK  
**FULFLO** Specialties Co., Inc.  
REG. U. S. PAT. OFF.

BLANCHESTER, OHIO

# HYDRATROL LATHES

## Keep Right On Cutting

... CUTTING COSTS  
... CUTTING TIME  
... CUTTING REJECTS!



WHEN HYDRATROL LATHES enter the machine tool picture, the story is invariably one of Lower Costs, Increased Production, and Improved Work.

Shop after shop is finding that it can do many machining jobs better with a Heavy Duty HYDRATROL LATHE. The 30" size, shown above, has all the ruggedness and power for the heaviest possible work. And its many refinements in design and construction result in an ease of operation comparable to small machines.

Why not let us show you what a Heavy Duty HYDRATROL LATHE could do in your shop? Send us prints for a time-and-money saving recommendation.

Standard Type, Heavy Duty Lathes, 20" to 36"  
Large Hollow Spindle Type Lathes, 18" to 36"

MOVIE SOUND FILM, in natural color, available, showing functions of Hydratrol Lathe, advanced construction features, and production machines in operation. Ask the Lehmann representative for a showing.

LEHMANN MACHINE COMPANY, ST. LOUIS 3, MISSOURI

# HYDRATROL LATHES

(HEAVY DUTY TYPE)

# ABRASIVE No. 1/2

## HAND FEED SURFACE GRINDER

IDEAL FOR SHORT RUN PRECISION JOBS



If you will send us serial numbers of Abrasive machines on the Government Surplus Tool list we will endeavor to supply you with information, attachments or repair parts.

### SPECIFICATIONS:

WORK CAPACITY 15" long, 10" wide, 12" high.

TABLE SIZE OVERALL 48" x 11 1/4"

#### SPINDLE

Removable cartridge type, 1750 R.P.M. Phosphor-bronze adjustable box (front); 2 ball bearings (middle & rear)

#### GRINDING WHEEL

Standard 12" diameter

#### FEEDS — ALL HAND FEEDS

Transverse graduated .001", Vertical .00095". Metric graduations if specified.

#### DRIVE

1 H.P. motor mounted on spindle  
NET WEIGHT 1350 lbs.

Write for complete bulletin.

**ABRASIVE MACHINE TOOL COMPANY EAST PROVIDENCE 14, RHODE ISLAND**

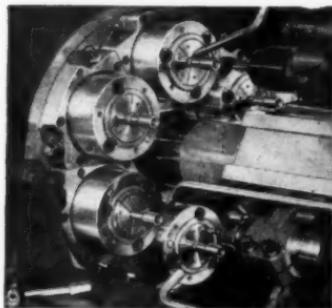
## LEADERSHIP BASED ON ACCOMPLISHED FACTS



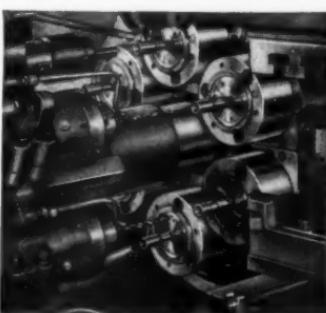
This will interest you if your work involves small accurate parts. In tooling and equipping our Model 65 Six Spindle Automatic Chucking Machines for the requirements of the Moeller Instrument Company, Richmond Hill, New York, provision was made for handling a variety of sizes of similar parts in various metals including steel, nickel copper alloy, and naval brass forgings.

The piece illustrated is a  $3\frac{1}{8}$ " long tapered steel part,  $\frac{1}{2}$ " diameter on the large end, calling for drilling to a depth of  $3\frac{1}{8}$ ". It is held by specially designed collets, each with an extra long bearing, for drilling a deep hole leaving a thin wall. Six operations are performed at a gross production rate of 187 pieces per hour. Not a dramatically difficult assignment but a good illustration of the adaptability of New Britains to a wide range of applications . . . and another instance of high production at low cost per piece.

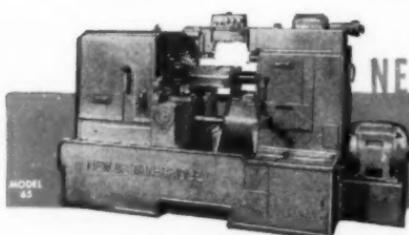
Many do not realize the wide range of practical applications for multiple spindle automatic screw and chucking machines. Our sales engineers do, and offer you a competent engineering service you may profit by investigating.



FRONT VIEW — New Britains are built to allow easy accessibility for simplified chucking, cutting tool and attachment setup.



REAR VIEW — New Britain construction provides extra large chip space . . . lots of room from all sides giving excellent visibility and easy tool adjustment.



### NEW BRITAIN AUTOMATICS

THE NEW BRITAIN MACHINE COMPANY

NEW BRITAIN, CONNECTICUT

New Britain-Gridley Machine Division

M-01038-A

## THE BETTER PLUG GAGE



**STANDARD**

**DuBo\***  
*Gage*



DOUBLE END  
Sizes .240" to 1.510"  
(6 to 38 mm)



SINGLE END  
Sizes 1.510"  
to 6.010"  
(38 to  
152 mm)

Gaging Surfaces are  
portions of a sphere



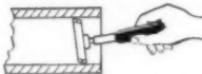
Gaging Surface

### LIGHT IN WEIGHT



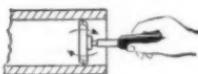
DuBo Gages over 1" diameter weigh 70% to 80% less than corresponding AGD cylindrical plug gages. Their lightness gives greater ease in handling, resulting in less strain on the operator, fewer errors due to fatigue.

### EASY TO ENTER



DuBo requires no jockeying to enter, even into undersize bores. Inserted with the handle tipped slightly above the bore axis, it enters easily, more easily than even a piloted cylindrical plug gage. This means time saved.

### DEFINITE CHECK



The check is made by lowering the handle gently, bringing gaging surfaces in contact with bore walls. Whether or not handle will drop freely below bore axis is the definite, yes-or-no answer even if part is close to limit.

DuBo Gages  
can detect  
out-of-roundness  
and taper whether  
enlarging toward  
or away from  
the opening!

\*Patents Pending

IT ALL ADDS UP TO  
PRODUCT IMPROVEMENT  
along with COST SAVING

Write for Bulletin

**STANDARD GAGE CO., Inc., Poughkeepsie, N.Y.**

**"PRECISION and SKILL"**

This is a 40-minute, 16mm, sound motion picture which is available to interested groups. It demonstrates important features and uses of the GREENLEE "6". Write for a date.

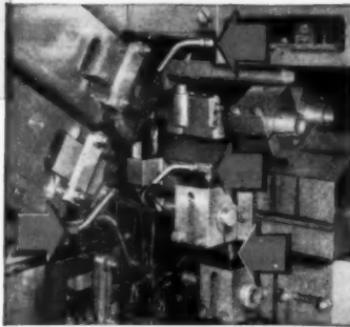
ANOTHER BUILT-IN FEATURE OF THE  
**GREENLEE "6"**  
AUTOMATIC SCREW MACHINE



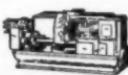
**ADJUSTABLE  
COOLANT OUTLETS ARE  
BUILT INTO THE MACHINE**

**EASILY POSITIONED.** It is a simple matter to set coolant nozzles on the GREENLEE "6". A totally enclosed coolant system is an integral part of the machine, with outlets on the cross-slides, main tool slide overarm, and also on the attachments. Short, flexible nozzles are easily attached wherever desired in order to put the coolant exactly where it is wanted. Each outlet is individually controlled by a separate valve. There is a main control valve for the entire system within easy reach on both sides of the machine. The speed and ease with which coolant can be directed to the cutting areas is an important factor in making fast, efficient set-ups.

**OTHER FEATURES.** The GREENLEE "6" has many other distinctive features which contribute to efficient, accurate work and quick change-over. Write today for a copy of our 20-page descriptive bulletin "Greenlee Automatic Screw Machine" and learn why the GREENLEE "6" is often called "The Operator's Favorite."



The picture above shows location of coolant outlets on a cross-slide, on two of the attachments in first and second positions, and on the overarm.



**GREENLEE BROS. & CO.**  
1825 MASON AVE., ROCKFORD, ILLINOIS

WRITE TODAY FOR MORE FACTS

MULTIPLE SPINDLE DRILLING, BORING, TAPPING MACHINES • AUTOMATIC SCREW MACHINES • AUTOMATIC TRANSFER PROCESSING MACHINES



## Tolerance Allowed - .0003", Yet...

### Sunnen Precision Honing Held These Bushings Within .0001"

Lapping and other methods of honing failed to produce a hole without excessive bell-mouth, usually .004" to .005".

The stock is water hardened steel with a C scale Rockwell of 65. Hole finished diameter is 2.375" — plus .0003", minus zero.

On any job from .125" to 2.625" in diameter the Sunnen Precision Honing Machine is guaranteed to produce an accurate hole within .0001". In hardened steel accuracy has been held to within .000025". It can be quickly and easily set up. Easy to operate — requires no skilled labor. Corrects errors of out-of-round, taper and rainbow. Maintains alignment between two holes. Duplicates sizes easily.

For complete details, write for descriptive literature — or ask a Sunnen engineer to show you how Sunnen honing can be used in your plant.

### SUNNEN PRODUCTS COMPANY

Canadian Factory: Chatham, Ontario  
7935 Manchester Ave., St. Louis 17, Mo.



### Typical Jobs



Bronze Valve. The Sunnen method of honing is used to secure a high finish and accuracy.



Aircraft Valve Guide. Valve tappet roller pin hole honed to 6 micro-inch finish.



Diesel Engine Fuel Injector Cylinder. "So accurate that a piston can be fit within .00005 inch."



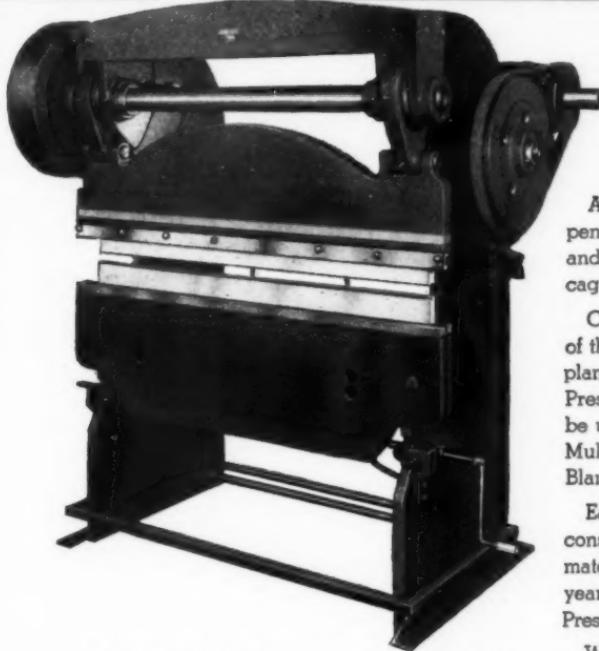
Hydraulic Two-Way Control Valve. Hole is honed to eliminate leakage.



Carburetor Idler Valve Jet. Hole is honed after reaming for smooth action.



# Powerful CHICAGO STEEL PRESS BRAKE



## TYPE "300"

A POWERFUL, rugged, inexpensive Press Brake, designed and built to the standards of Chicago Steel Forming Presses.

Can handle 40 to 50 percent of the work done in the average plant, thereby releasing the larger Presses for heavier work. Can be used for Forming Embossing, Multiple Punching, Notching, Blanking, etc.

Easy of operation, accurate and constructed of highest quality material and backed by over 45 years experience building Steel Press Brakes and Bending Brakes.

World's largest manufacturer of Steel Hand Bending, Power Bending and Power Press Brakes.

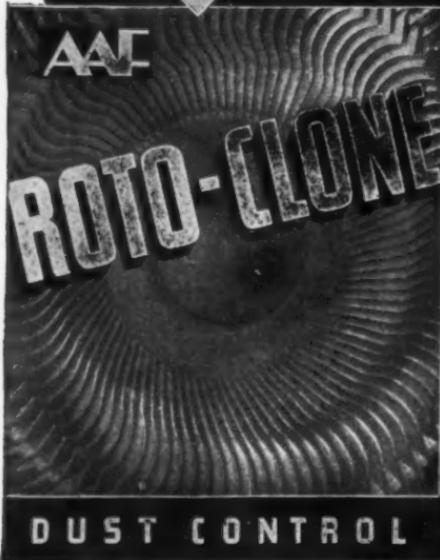
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A Small Steel Welded Construction Press Brake a brute for punishment and a prodigious worker for the Sheet Metal Plant—

—3 sizes—capacities 10 gage, 4 ft. long; 12 gage, 5 ft. long; 14 gage, 6 ft. long. Powered by 1½ h. p. motor.

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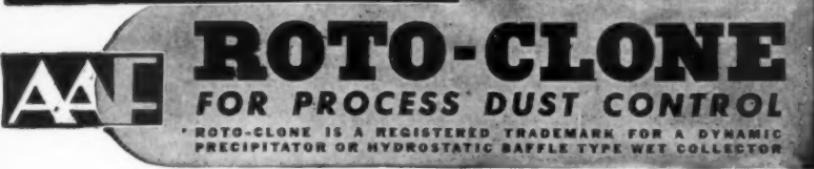
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Incorporated

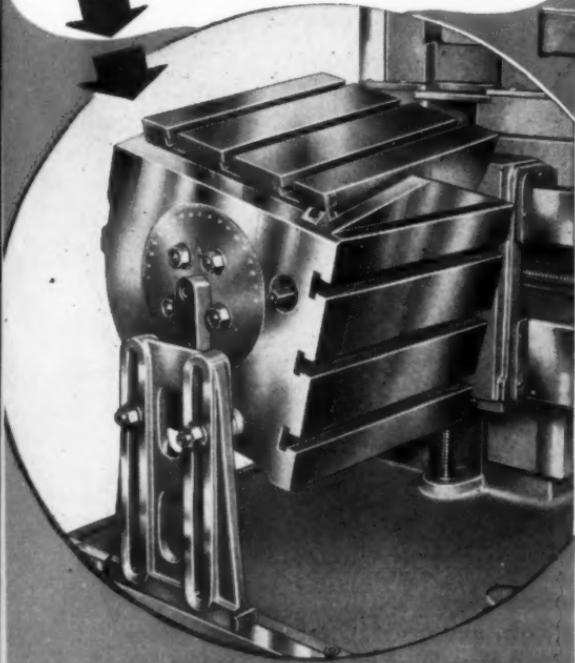
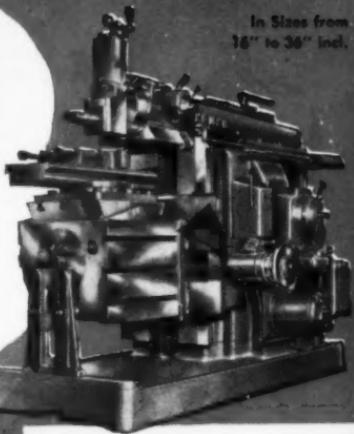
100 Central Avenue, Louisville 8, Ky.  
In Canada: Darling Bros., Ltd., Montreal, P. Q.



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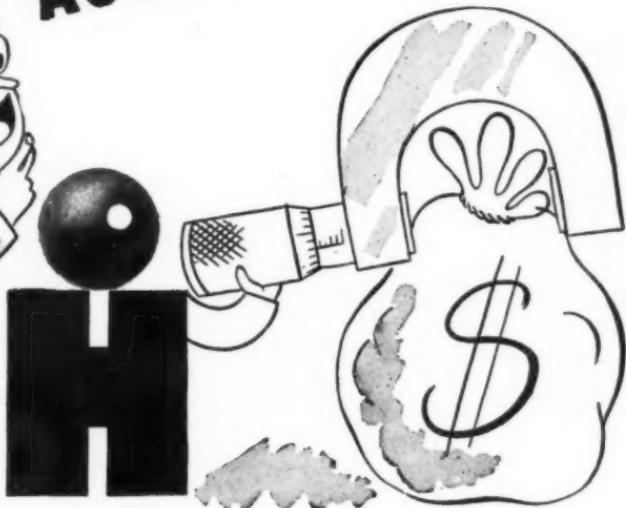
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MANUFACTURERS OF PRECISION MACHINERY SINCE 1917



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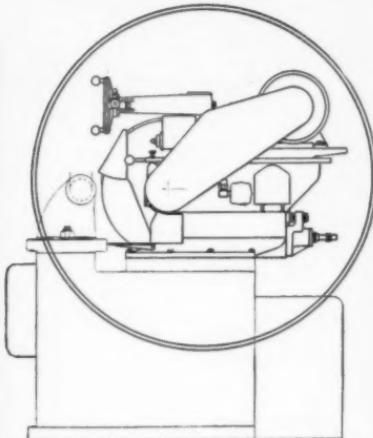
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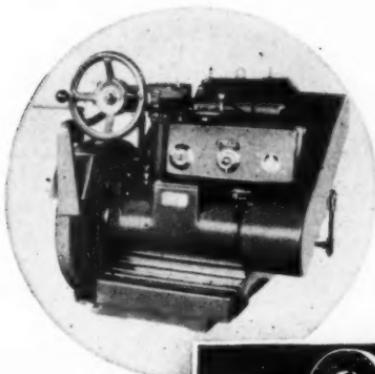
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**FITCHBURG**  
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**INEXPENSIVELY...**



FITCHBURG Bowgage Head mounted on another make of grinding machine



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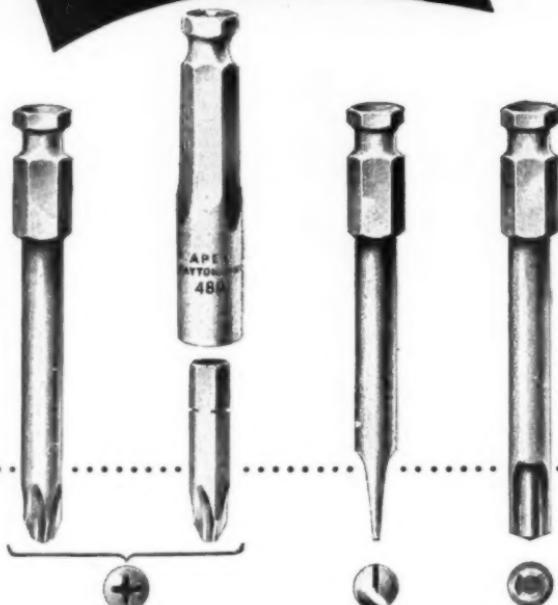
Just as we did in the above case—and in many others—we'll be glad to prove to your satisfaction the ease, the simplicity, and the inexpensiveness of installing Fitchburg Bowgage Heads on your present grinders. With your grinding equipment thus modernized, the resulting mass production applied to your precision grinding will soon pay off the small cost involved. The FITCHBURG Bowgage Head is a self-contained grinding unit, with all its movements and controls within itself. It has rapid traverse, slow grinding feed, grinding dwell or spark out, and rapid return to starting position—all started by one push button. It is precise to ".0002", minimizing spoilage. It can be removed and remounted for other work, if operations are changed—thus protecting your investment in grinding machinery. Fitchburg engineers will welcome the opportunity to help you solve your grinding modernization problem. There is, of course, no charge for this service. Send us the details—blueprints if available—and see how easily and inexpensively you too can have FITCHBURG AUTOMATIC PRECISION GRINDING in your shop.



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**APEX** screwdriver bits

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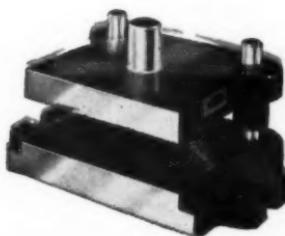


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Their built-in performance features insure production-line speed, economy and dependability. Made of high speed steel, Circle "R" Combination Center Drills are listed below for your convenience.

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701	C-2	13/64"	1/16"	1 1/8"
702	D-1	15/64"	5/64"	2"
703	E-1	3/16"	3/32"	2 1/8"
704	E-2	3/10"	1/16"	2 1/8"
705	F-1	7/16"	5/32"	2 3/4"
706	F-2	7/16"	3/16"	2 3/4"
707	J-1	1/2"	7/32"	3"
708	J-2	1/2"	9/32"	3"
709	M-1	5/8"	7/32"	3 1/4"
710	M-2	5/8"	9/32"	3 1/4"
711	N-1	3/4"	1/4"	3" 1/8"
712	N-2	3/4"	5/16"	3 1/2"

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For fast, efficient rough grinding and fine finishing of carbides, stellite, high speed steel, and other modern tools, install Prosser Carbide Grinders. Their rugged construction, modern design, and ease of operation insure long, dependable and profitable service.

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*Check These Advantages — You get Them  
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**NON-FERROUS ALLOY** with 20 times the life of the best steel.

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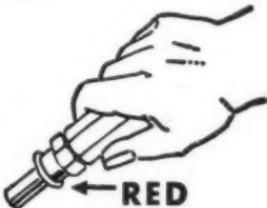
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Color identifies plug instantly. Weight is reduced. Secure locking — no slipping. No marring or scratching of plugs as with metal collets.

**GREEN**  
for  
"GO"



**RED**  
for  
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**NOW . . . all the well-known Delta-Milwaukee operating advantages in a low-cost drill press with a speed range up to 12,000 R. P. M.**

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Single-spindle model



## Super-Hi-Speed Drill Press

**Greater accuracy on small-hole drilling of plastics, aluminum, and other metals**

Here's a sensitive, low-cost 14" drill press for small-hole work from .025" to  $\frac{1}{4}$ " diameter. Drills to center of 14" circle.

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See your Delta industrial distributor for the complete story on the Delta-Milwaukee Super-Hi-Speed Drill Press.

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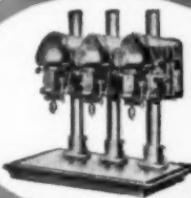
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M-18A



2-spindle model



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countershaft unit,  
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Three wheel heavy  
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FLEXIBLE SHAFT EQUIPMENT

# ACCURACY for the tool room SPEED for production drills

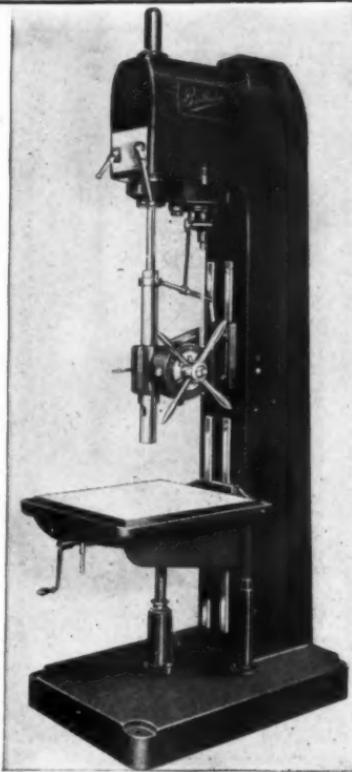
## The "RPMster" Cuts Turn-out Costs

"The drill of 101 speeds," it's called . . . speeds instantly changed by the sensitive finger-tip control while drilling! This sturdy, accurate "Buffalo" drilling machine has "paid its way" in hundreds of tool rooms and production set-ups throughout the punishing war years . . . respected for its ability to drill up to capacity at remarkably low cost.

For all details on the Buffalo "RPMster", send for Bulletin 3257.

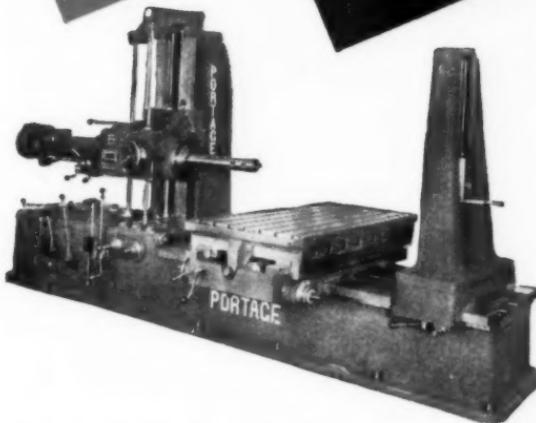
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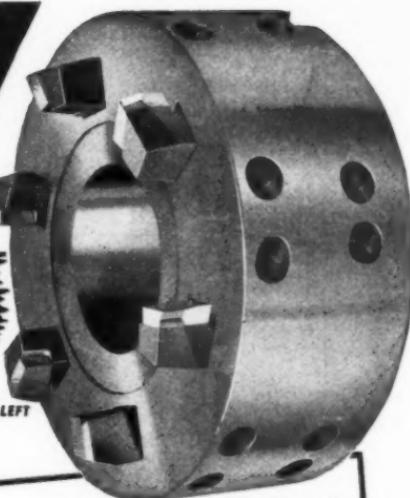
# NEW

## LOVEJOY "CUTSALL"

**CARBOLOY TIPPED  
CARBONIZED CARBIDE  
TOOL-BIT-TYPE**

## FACE MILL

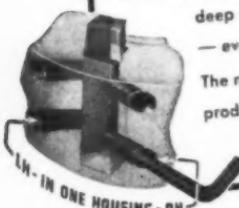
- **POSITIVE and NEGATIVE RAKE, RIGHT and LEFT  
HAND in ONE HOUSING**
- **FINE BLADE ADJUSTMENT**
- **EXTRA LARGE CARBOLOY TIPS**



Lovejoy proudly presents another new face milling cutter that is designed especially for the most modern milling practices. The tool-bit-type blades can be supplied for right- or left-hand cutting, with the same housing. The extra large Carboloy tips mean extra long wear — the face of the blades is back of center so that positive or negative rake is easily obtained from the same blades. The rear on the blade is tapered so that fine adjustment may be made with rear set screw — front set screw securely locks blade in the housing. Blades are sharpened on an off-hand, adjustable table grinder exactly the same as regular lathe tools.

This new Carboloy tipped "Cutsall" cutter is available in 6", 8", 10" and 12" diameter sizes. All sizes use the same blades for convenience and economy. Note the husky, balanced construction — it is your guarantee that facing cuts up to  $\frac{3}{8}$ " deep can be taken on tough stock even when spindle speeds are high — even when cuts are intermittent.

The new Lovejoy "Cutsall" has the goods to deliver the goods. Write for production information, prices and delivery — all three will please you.



**LOVEJOY  
TOOL COMPANY, INC.  
Springfield, Vermont, U. S. A.**



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Dual visibility — Sight glass on side of lubricator bowl on exclusive SUPER feature, shows exact oil level maintained in bearing plus oil supply in reservoir, eliminating guess work.

There is no drippage, no waste, no overflow. Oil is automatically fed to the bearings as required.

Nationally known authorities estimate that 75 per cent of all machinery repairs are caused by inefficient and improper lubrication, and that 85 per cent of the oil bought for lubricating purposes is never used by the bearing surface for which it was intended. **WRITE FOR LITERATURE.**

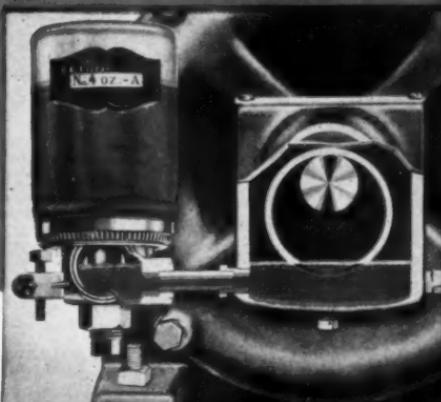
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SMALL PRECISION DRILL JOBS

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*Midget Type*  
**SPRING JIG**

NO. 1500



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**FREE!**

Full size Template  
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Siewek's new midget size Spring Jig is designed for precision work. It simplifies drilling set-ups for countless small parts including radio components, electrical devices, instruments, etc. Rapid clamping action is powerful and positive. Work is held securely between two accurately parallel surfaces.

Spring tension is quickly adjustable. Locking action does not release under chatter. Top plate is interchangeable. With a **NEW LOW PRICE** new top plate—the Siewek Midget-type Spring Jig can handle a new operation *at a fraction of the cost of an extra jig*. This saves retooling time and eliminates much "idle time" for drill presses.

**35<sup>00</sup>**  
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Write for complete description and dimensional drawings. F.O.B. Ferndale, Mich.

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Simonds Band Mills produce a special tough alloy steel for these saws. Tools are sharp, perfectly milled, and set true on both sides of blade, to give clean, easy cutting and long saw life. And joints are welded for equal strength with rest of blade.

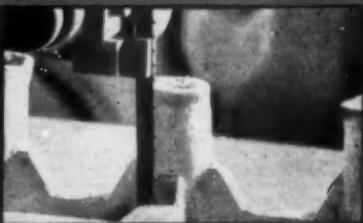
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Here's the extra cutting capacity for large chips from aluminum, magnesium, plastic and wood. These saws may sharp so long that it's economical to replace them and save resharpening. They have the same hardened tooth-edge as the Regular Hard Edge Saws. Made in widths from 4" to 17". Tooth-spacings: 2, 3, 4, and 6 per inch.

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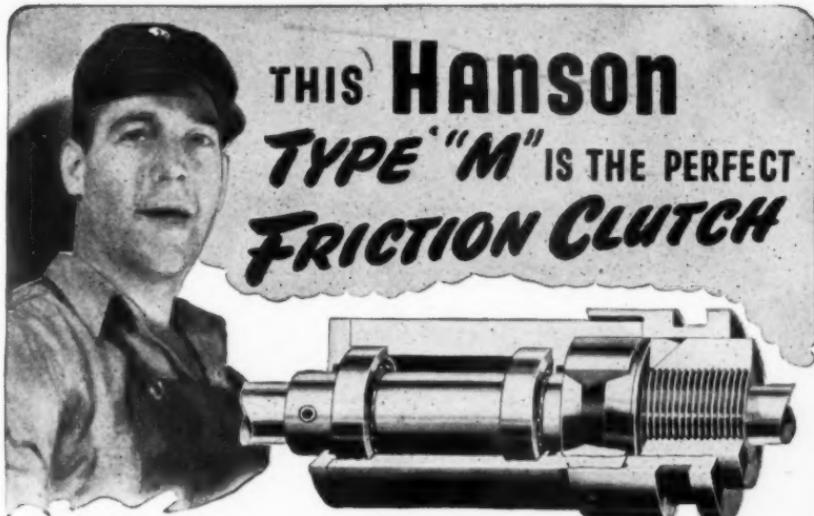
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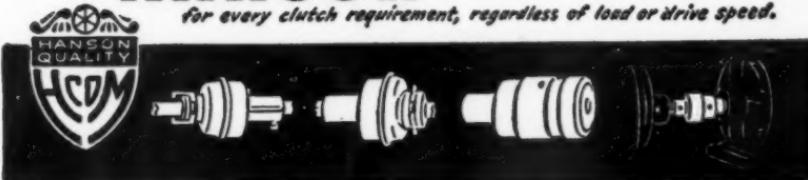
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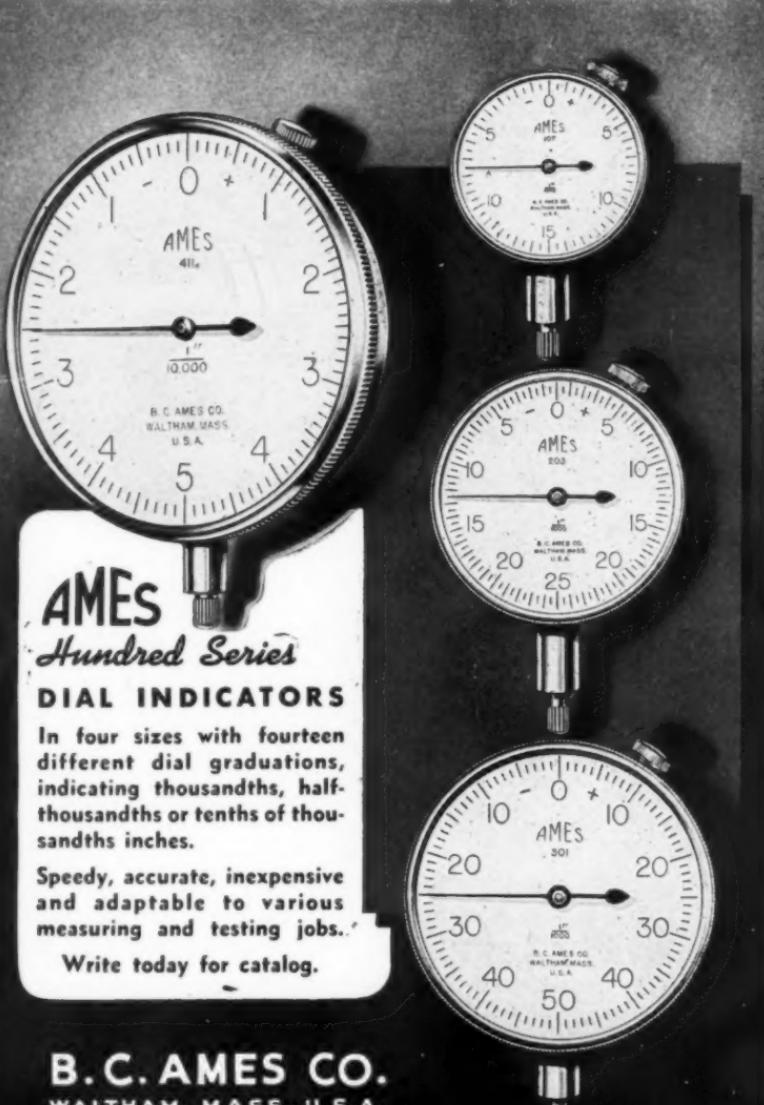
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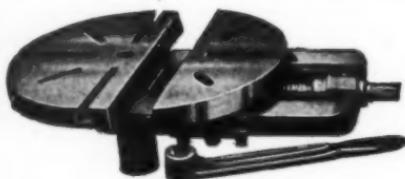
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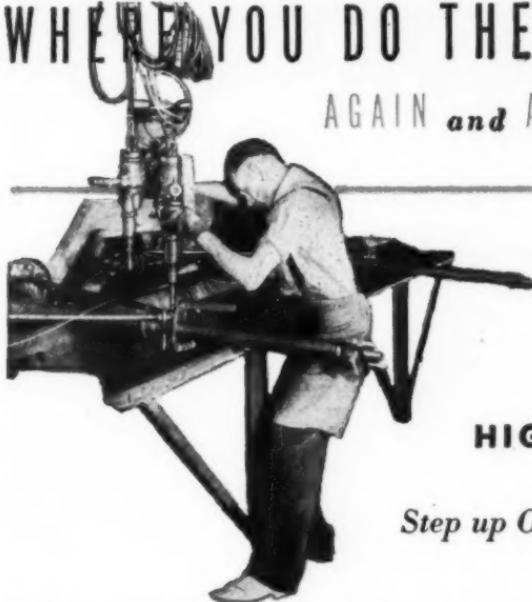


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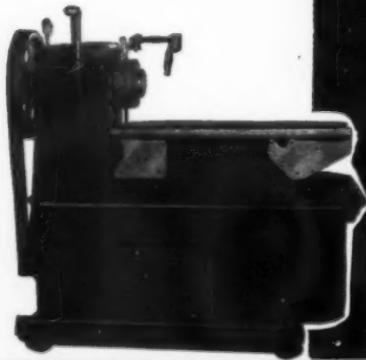
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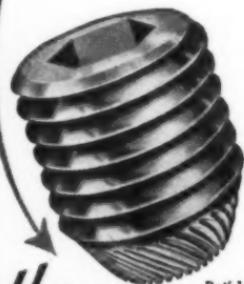
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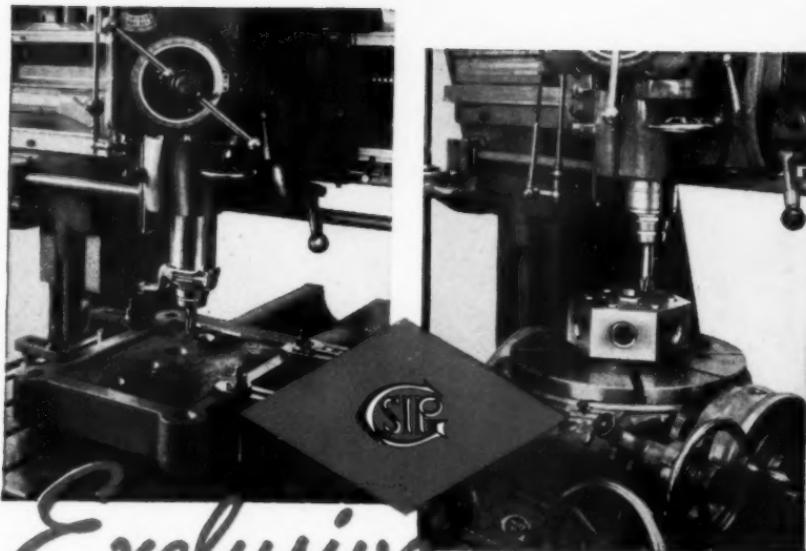
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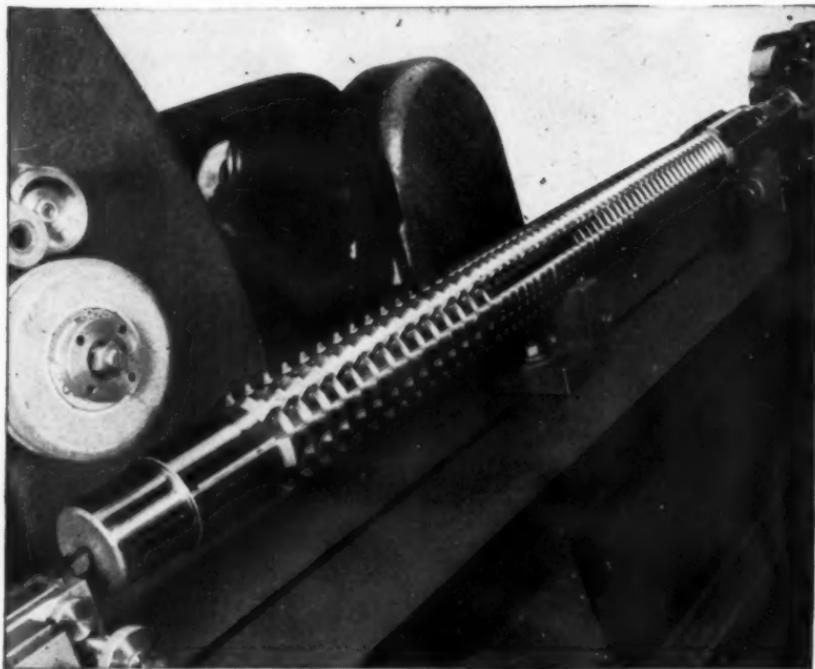
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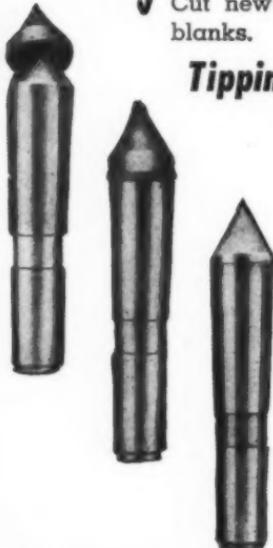
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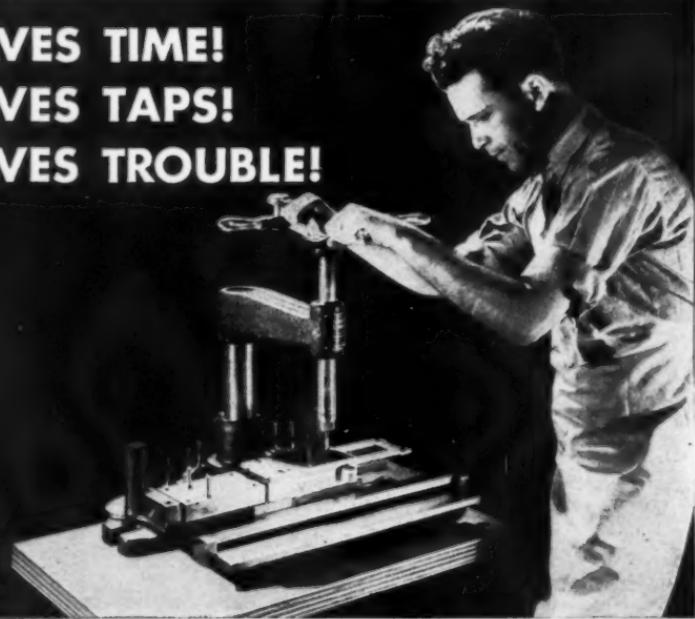
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**HAND  
TAPPER**

TRADE MARK

Here's what we mean by

# VICE-GRIP JAW



#### SPECIFICATIONS

MODEL	SIZE	TOOL CAPACITY
60	0	1/8 to 5/16
61	1	3/16 to 3/8
62	2	1/4 to 1/2
64	4	5/16 to 5/8

With 15° or parallel cutter channel either left or right hand.

## Exclusive in Clark Adjustable Tool Holder

Equalized pressure over *full* length of cutter channel — screw-operated jaw runs right to cutting edge, hugs bit so it can't slip, sag, or break! Takes 4 or more sizes of square, round, short or narrow tool bits. Parallel models for carbide bits, threading tools and boring bars.

Call your Clark Cutter Jobber today,  
or write for catalog MTBB-8

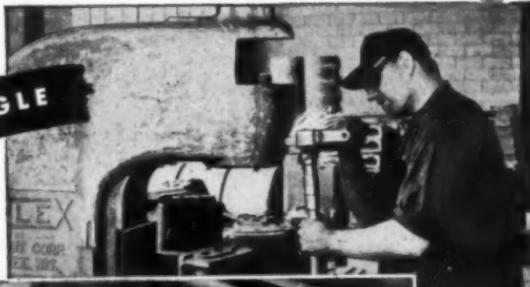
CLARK  CUTTERS

*Robert H. Clark Company*

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# FASTER FINISHING

AT ANY ANGLE



IN ANY POSITION



with **Mall** FLEXIBLE SHAFT  
REG. U.S. PAT. OFF. GRINDERS

Regardless of the angle or position of the work, a Mall Flexible Shaft Grinder handles every finishing job with speed and efficiency. Its constant high wheel speed, ball-bearing mounted straight and angle spindles, extra power and stamina accelerate *Grinding, Sanding, Wire Brushing, Polishing and Buffing*. Its

caster base mounting and tilting swiveling motor make power available in any position. The flexible shaft allows the operator to use the interchangeable working tools at any angle. This complete flexibility — combined with its broad range of applications and high over-all efficiency — makes a Mall Flexible Shaft Grinder the most profitable tool any factory could own.

Ask your Supplier for Mall Flexible Shaft Grinders, or write direct for literature and prices.

**MALL TOOL COMPANY**

7742 South Chicago Avenue

Chicago 19, Illinois

★ 25 Years of "Better Tools For Better Work".

# SENSITIVE TAP HEAD FOR FAST, ACCURATE TAPPING

- ★ Cover clamping eliminates chatter
- ★ Rigid mounting reduces vibration

The Procunier cover clamping tapping head is ideal for light, sensitive drill presses. It clamps directly to the drill press quill for greater rigidity and freedom from chatter. Vibration and the tendency to "run-out" or "bell mouth" is minimized because of the short, rigid mounting.

Procunier Sensitive Hi-Speed Tap Heads are precision built for accurate tapping at high speeds. Driven by a double-cone, cork-faced friction clutch, the tap is protected by a soft "cushion" effect. The operator can quickly detect the presence of a dull or "loaded" tap by the amount of pressure needed to drive the tap. Bottom tapping is done as easily as through tapping, since the clutch instantly slips should the tap strike bottom or stick due to tap loading.

Send coupon today for bulletin giving full details, specifications and prices.

## FAST, ACCURATE EXTERNAL THREADING WITH ACORN DIES



Do external threading jobs faster with a Procunier Tapping Head which holds standard Acorn dies. Cut external threads quickly in brass, die castings and aluminum.

## PROCUNIER SAFETY CHUCK CO.

14 S. Clinton St.  
Chicago 3, Ill.



### PROCUNIER "TRU-GRIP" TAP HOLDER

The new "Tru-Grip" is a smaller, lighter and more accurate tap holder. A broached section in the chuck receives the flattened surfaces on the spring collet, while the tap has a positive drive through the square hole in the collet. The tap is held in alignment by the round and driven by the square — taps are never scored or "chewed up."

### Mail This Today

Procunier Safety Chuck Co.  
14 S. Clinton St.  
Chicago 3, Ill.

Send me bulletins on  Procunier High Speed  
Tapping Heads  Tru-Grip Tap Holder

Universal Tapping Machines

Name .....

Address .....

City ..... State .....

# AMAZING! INCONCEIVABLE! UNBELIEVABLE!

NEW PRE-SHARPENED SHEARCUTTER TOOL BIT

Actual photograph of a 3/8" SHEARCUTTER Tool Bit in production taking a finishing cut 1 1/8" deep under power feed. (3" Diameter C. R. S., 300 RPM, .005 Feed, Cutting Speed 240 FPM.)

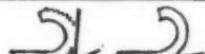


## THIS AMAZING NEW INVENTION—

- Saves from 10% to 50% on labor costs.
- Increases production from 50% to 100%.
- Decreases power consumption from 30% to 70%.
- Takes extremely deep cuts with remarkable ease.
- Lasts from 3 to 5 times longer between regrinds paying for itself from savings in regrinding time alone.
- Generates less heat and saves on cutting compounds.
- Tends to resharpen itself automatically.
- Gives smoother finish and greater accuracy.
- Fits standard tool holders.
- Is interchangeable with less efficient tool bits.
- May be used on ferrous and non-ferrous metals, alloys and plastics.

**YOU CANNOT AFFORD NOT TO USE THESE TOOL BITS!!**

Watch for other  
amazing SHEAR-  
CUTTER TOOLS  
soon to be an-  
nounced.



**THE SHEARCUTTER PRINCIPLE**  
Illustrated at left is the conventional type of tool bit, breaking down or tearing the metal. At right: The slicing knife-like action of Shearcutter Tool Bits.

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DISTRIBUTORS WANTED

HERE'S THE PORTABLE SAW  
THAT SAVES TIME AND  
LABOR ON CUT-OFF JOBS

*...a handy tool for you*



Wells No. 8

*Specifications*

CAPACITY: Rectangular (Special Guides)	8" x 16"
ROUNDS: . . . . .	5" x 24"
MOTOR: . . . . .	8" Diameter
SPEEDS: . . . . .	1/2 H. P., A. C. or D. C.
WEIGHT: . . . . .	Selective 60, 90, 130 feet per min. Approximately 665 pounds

All around the plant you'll see them — stock room, tool room, machine shop, maintenance dept.— wherever there is cutting to be done. Write for bulletin—or ask for a representative to call and give you the details on the low-cost Wells.

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**METAL CUTTING  
BAND SAW S**

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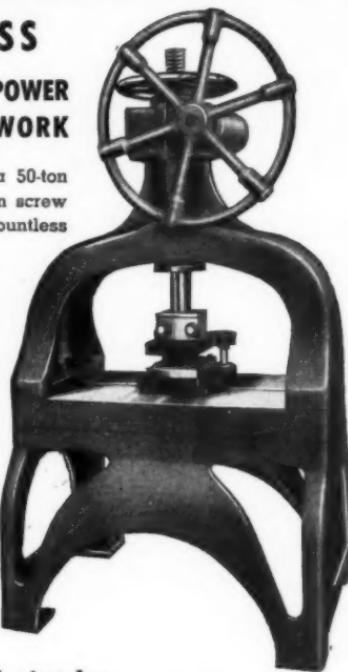
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## UTILITY PRESS VERSATILITY . . . POWER FOR TOOL AND DIE WORK

Whether the lightest touch or a 50-ton pressure is required, this modern screw press is indispensable for the countless press jobs that confront busy tool and die rooms.

You will find it efficient for shearing, assembling and lining Punches and Dies, and for separating Punch and Die Holders on large Liner Pin Die Sets. The 3" hole in the bed allows it to be used for short broaching operations and for disassembling spindles or shafts from press fits in bearings.

Also has many Arbor and Straightening press uses.



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Choose an assortment of Bokum Boring Tools—of the sizes you generally use—and let us put them in this sturdy, hardwood, individual box—which we shall furnish without charge. You'll find this a most convenient way to keep these tools together—ready for instant use. The box will hold 8, 10, or 12 tools of your selection in sizes up to No. 3.

You'll prefer Bokum Tools for boring—once you use them—because the clearance angle remains constant through entire life of tool—resharpening never changes form of tool, since only one face is put to grinder—down time for regrinding reduced—finish lapped cutting surfaces produce better bores with faster speeds.

*For facing and bottoming, use Style B*

*For internal threading, use Style C*

*For general boring, use Style A*

Ask for catalog H-1139 for high speed steels—catalog H-398 for carbide tipped.



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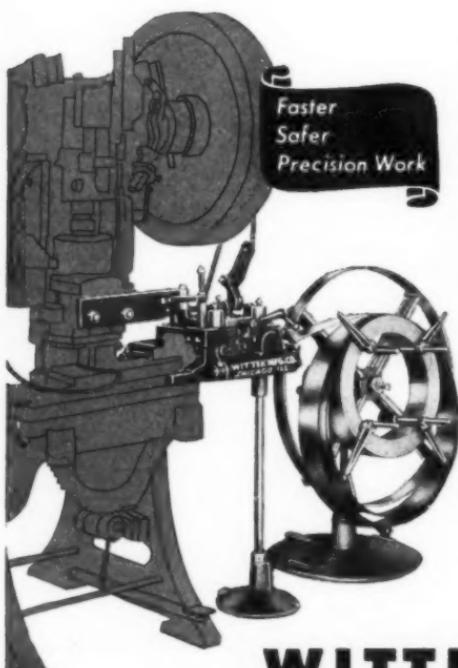
SINGLE POINT BORING TOOLS—INTERNAL THREADING, BOTTOMING AND FACING TOOLS—CARBIDE TIPPED TOOLS

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Equip with

## WITTEK

### Automatic Roll Feeds and Reel Stands



Wittek Roll Feeds are being used extensively by war plants in their large volume production of high quality metal stampings. The flexibility of Wittek Roll Feeds will assist these plants in their peacetime conversion through their adaptability to various jobs. Keen competition will demand the utilization of equipment to its point of highest efficiency. If your postwar plans include punch press production of parts from coiled strip stock—investigate now the many possibilities of Wittek Roll Feeds and Reel Stands.

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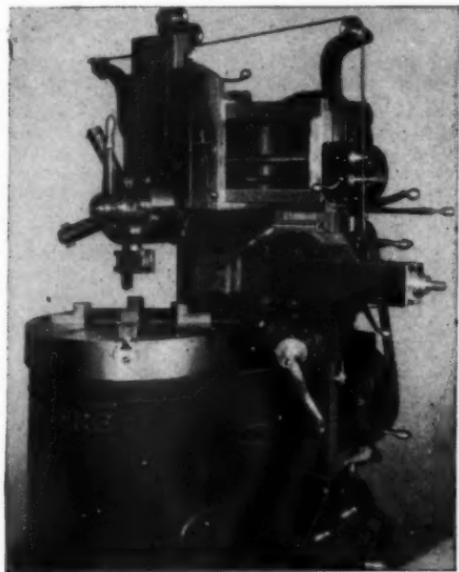
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ROLL FEEDS  
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Arrangements have been made with one of America's leading machine tool dealers to take your used machines in trade for

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Turn your out-of-date equipment into brand new Rogers Mills. We will appraise whatever old equipment you wish to trade in. This offer permits you to have all of the time-saving, money-saving efficiencies provided by NEW ROGERS MILLS.

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**MACHINE WORKS, INC.**

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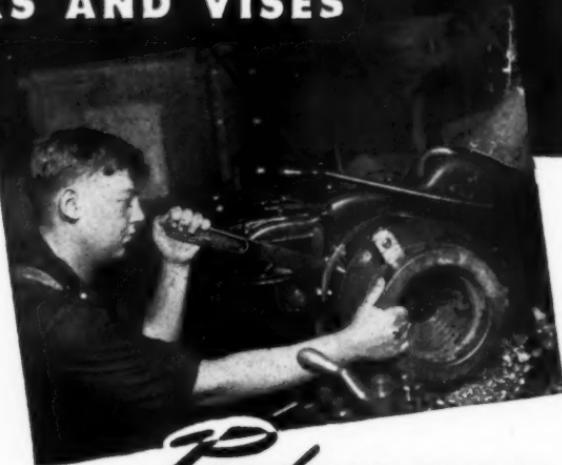
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# Barker WRENCHLESS CHUCKS AND VISES



*The Barker Wrenchless  
Three-Jaw Chuck.*



*Produce more  
AT LOWER COST*

Whether you are on war work or contemplating reconversion, it will pay you to investigate Barker Wrenchless Chucks and Vises.

Ruggedly built for long trouble-free service, easily operated, and low in cost, they step up output 25% to 75%, or more, on turrets, engine lathes, cutting off machines, drill presses and other types of chucking machines.

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*The Barker Wrench-  
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## THOMAS HOIST CO.

### *Chuck Division*

20 South Hoyne Avenue, Chicago 12, Illinois

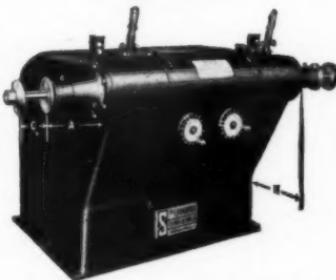
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**1500 to 3000 r.p.m., Instantly!**

The Standard Infinitely Variable Speed Buffer and Polisher with its Speedial Control gives you any spindle speed from 1500 to 3000 r.p.m. instantly.



Type BVP  
Pedestal  
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Type R2V. Independent Spindles.  
Two 5 H.P. or two 7 1/2 H.P.  
Motors.

(Each operator is independent of  
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Type IBVB 1 H.P. Bench Model  
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**8 MODELS FROM 1 H.P.  
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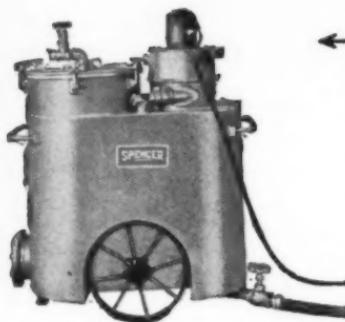
- Maintains peripheral speed throughout wheel life.
- Gives you maximum usable wheel life.
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2486 RIVER ROAD

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Pick-up position: Suction hose on intake at swivel connection — Two way valve open — slide valve in — three way valve open to atmosphere.



Discharge position: Pressure in tank — hose on drain valve — two way valve closed — slide valve out closing intake to vacuum producer and opening ports to allow air to be drawn into vacuum producer from outside — three way valve closed delivering air into tank under pressure.

# The Spencer SUMP-VAC Cleans Sumps in 2 to 10 Minutes

A Spencer vacuum producer mounted on a closed tank on wheels removes all liquid and sludge from sump tanks in two to ten minutes compared with half an hour with former methods. The rate of pick up is 40 gallons of liquid per minute.

The tank capacity is 125 gallons or enough for 3 to 5 average sumps. A filter basket collects chips and heavy sludge. A Neoprene float valve prevents over-filling of the machine. It is emptied by gravity in two minutes. By turning the valves provided with the machine and connecting the hose to the drain valve,

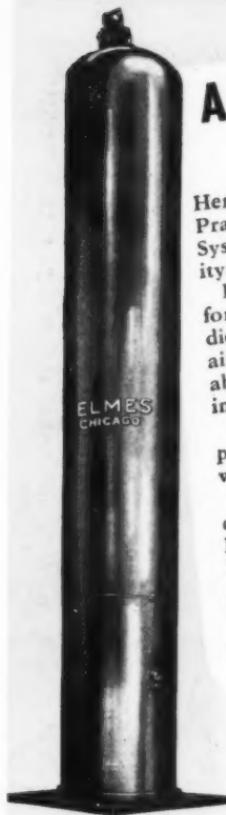
liquid can be discharged under approximately 3 lbs. pressure. This permits raising the liquid to a height of 6 ft., emptying the tank into a drum or other container for easy disposal.

No priming is necessary — and all material in the sump tank is cleaned out by air vacuum after the liquid is removed.

Sizes  $\frac{3}{4}$  or  $1\frac{1}{2}$  horsepower, universal or single phase motors, 25 to 60 cycles, 110 or 220 volts or d.c.;  $12\frac{1}{2}$  foot vacuum hose lengths and 50 foot cable extension. Ask for the bulletin.

**SPENCER VACUUM  
CLEANING**

THE SPENCER TURBINE COMPANY, HARTFORD 6, CONN.



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Here's dependable hydraulic power. Smooth. Shockless. Practically limitless. A single Elmes Pump-Accumulator System will operate *any* number of presses at top capacity, three shifts a day.

Pistonless accumulator design eliminates line shocks for longer life of presses, piping, packing, valves, and dies. Elmes accumulators are ballasted by compressed air—have no *dead weight* which must be brought to an abrupt stop when flow is shut off—have no *internal moving parts* whatever; no ram; no packings...no leakage!

Patented Elmes controls work automatically to cut the pump in and out—maintain high and low liquid limits within the vessel—prevent excessive withdrawal.

The Elmes Pump-Accumulator System is a scientifically engineered combination of Elmes Accumulators, Elmes Patented Controls, and Elmes High-Pressure Pumps. We'll be glad to give you all the facts.

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Distributors from  
Coast to Coast

A typical Elmes pistonless-type accumulator. Has no packings; no internal moving parts. Can be set on usual factory floor. Compressed air ballasting assures uniform flow without line shocks; gives close pressure regulation. All pressure and volume capacities.

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Since 1851

## HYDRAULIC EQUIPMENT

Elmes six-plunger horizontal pump for 150 to 500 h.p. requirements, and pressures up to 35,000 p.s.i. Smaller pumps are vertical type. All embody every refinement of design and construction.

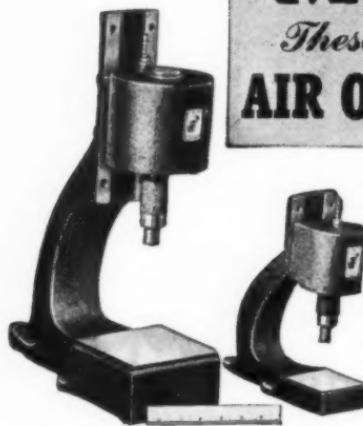


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Accumulator Bulletin No. 5100  
and High-Pressure Pump Bulletin  
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## AIR PRESSES

Two more useful new Mead devices for many operations. Power factor, four times line pressure. Handles many staking, crimping and similar operations. Dies and similar tools may be added.

## USE MEAD AIR POWER

Get faster, more economical production set-ups—investigate the entire "family" of Mead Air-Operated devices. Hundreds of progressive factories now use them to do better, faster, more economical jobs. Do you want to move things—lift them, slide them, tilt them—or hold them firmly? Mead Air Power will do it. Do you need a delicate, flexible touch—or tremendous pressure? Mead Air Power has them both. If you are interested in saving time, money and man-power now and for the future, investigate Mead Air-Operated devices now.

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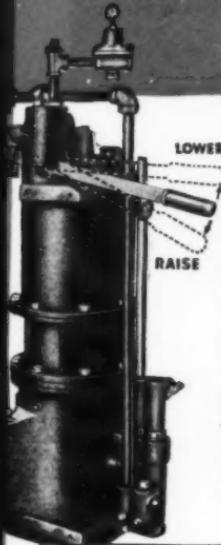
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# Now...Modernize

## YOUR KRW ARBOR PRESSES

... FOR HIGH PRODUCTION WITH EITHER  
AIR-OIL OR MOTOR-DRIVEN POWER UNITS



Thousands of standard KRW Hydraulic Arbor Presses can now be power equipped for production use by adding the new KRW Power Units. These units... either air-oil or motor-driven... are available for 25, 50, 60 and 75-ton KRW standard presses. When power equipped, and utilizing simple, inexpensive dies, these standard presses are adaptable to a great many bending, forming, stamping and straightening operations... relieving heavier and more expensive equipment for other work. Either type power unit is easily attached to the press. Adding the unit in no wise affects the famous KRW two-speed hand pumping feature... press can still be hand-operated. Study the specification table shown here in terms of your work-pressure and motor needs. Give us the serial number of your KRW press and electric current requirements and we will quote you price and quick-delivery date. Put your idle or infrequently used KRW hand-operated Arbor Presses to work where they will pay big dividends... on your production line.

**THIS IS THE NEW KRW  
AIR-OIL DRIVE THAT FITS  
STANDARD KRW  
HAND OPERATED PRESSES**

**AVAILABLE TONNAGE PRESSURES  
25-50-60 TON PRESSES**

AIR PRESSURE	7" AIR CYLINDER		9" AIR CYLINDER	
	2" Oil Cylinder	1½" Oil Cylinder	2" Oil Cylinder	1½" Oil Cylinder
100 TO 200 POUNDS	10 to 22 Tons	14 to 29 Tons	17 to 35 Tons	23 to 47 Tons

**75 TON PRESS**

AIR PRESSURE	9" AIR CYLINDER	
	2" Oil Cylinder	1½" Oil Cylinder
100 TO 200 POUNDS	25 to 51 Tons	33 to 68 Tons

**KRW Motor Drive develops up to Full Capacity  
of any KRW Hand-Operated Press.**

**THIS IS THE NEW  
KRW MOTOR-DRIVE  
THAT FITS  
KRW HAND OPERATED  
PRESSES**



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Serial number of our KRW Press is \_\_\_\_\_

Voltage \_\_\_\_\_ Cycle \_\_\_\_\_ Phase \_\_\_\_\_

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PRODUCED BY  
**LINCOLN PARK**

**ARE TODAY  
IN REGULAR  
PRODUCTION  
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For the past 10 years Lincoln Park has specialized in

the manufacture of precision Carbide tools and gages. This accumulated knowledge of Carbide fabrication and proper application, plus unsurpassed production facilities, has now been applied to the building of Carbide dies.

The dies illustrated, one for progressively piercing and blanking small motor laminations of silicon steel, the other for blanking and inserting paper liners in jar closures, are two examples of the Carbide dies produced to date.

If you are considering the use of Carbide dies—consider our experience and facilities. We will be pleased to submit quotations.

 **Lincoln Park INDUSTRIES, INC.**  
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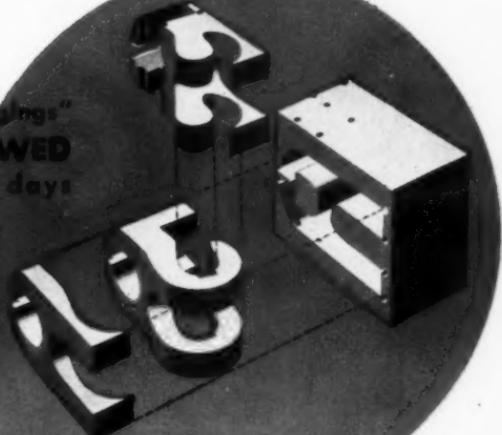
DoALL

Miracle

SHAPE CUTTING

for low-cost production

"castings" and "forgings"  
**CONTOUR SAWED**  
in minutes—not days!



Finished part (center) was Contour Sawed—the world's fastest metal-removing process—the only process that really slashes time and cost on this and countless other jobs. Contour Sawing slices off pieces in bulk—does not waste time "whittling" metal to worthless chips. Hundreds of razor-sharp, super-hard teeth on a band cut a narrow kerf; cutting is continuous—no lost backstroke motion. All materials, even tough alloys and steels 30 in. thick, can be Contour Sawed.

Think of the cost of many production parts—then remember that they can be Contour Sawed at a small fraction of that cost! This is your shortcut around costly production problems. Write for free booklet "**DoALL Equals Ten Plus**", which shows many amazing advantages of Contour Sawing.

DoALL STORES  
IN PRINCIPAL CITIES

*The DoALL Company*



MACHINE-TOOL DIVISION  
MINNEAPOLIS 4, MINN.

# Avey FEATURES mean A BETTER DRILLING MACHINE



The Avey Type MA-6 is made in the following capacities

- No. 2 —  $\frac{3}{8}$ " capacity in cast iron
- No. 3 —  $1\frac{1}{4}$ " capacity in cast iron

Any spindle of MA-6 can be arranged with any one of above FEATURES giving ease of operation —ideal for production set up.



YOU'LL GET MASS PRODUCTION  
WITH STATE  
FOUR-CUTTERS

A glance at the Four-Cutter shows that it's built for fast, accurate boring. Take the tough job of core drilling, for instance. The bits of the Four-Cutter counterbalance each other; so the bar doesn't spring away from the work. Furthermore, the chips have plenty of clearance; no binding and choking.

After a lot of punishment, the bits naturally become dull. But the Four-Cutter bits are easy to dress. Loosen the setscrews, run out the bits with the follow screws, and you have material for new cutting edges.

FIFTY STANDARD SIZES

Four-Cutter Boring Bars with plain bodies are made in 20 sizes . . . Four-Cutter Core Drills with fluted bodies are made in 30 sizes . . . ranging from  $\frac{3}{8}$ " to  $4\frac{1}{4}$ " minimum cutting diameters. Extension of the bits provides greater cutting diameters— $\frac{1}{8}$ " increase in the smallest size;  $1\frac{1}{4}$ " in the largest.

Special models are built to order—with two or more clusters of bits; with wear strips, pilots, collars, facing bits, oil holes, etc.

Mail coupon or write for particulars. Also indicate if you desire information on DIALSET Tools and VELSEY Black Granite Surface Plates.

State Manufacturing & Construction Co.  
1949 N. Dixie Highway, Franklin, Ohio

Send information on FOUR-CUTTER Drills; also  
on  DIALSET Boring Tools and  VELSEY Black  
Granite Surface Plates.

Individual

Company

Street Address

City, Zone, State

*then he said to himself:*  
**Tell the people what's cookin'**



Master of the picturesque is Fiorello H. LaGuardia. Asked why he chose a radio spot after relinquishing the Mayor spot in New York . . . his simple answer:

"People ought to be told what's going on."

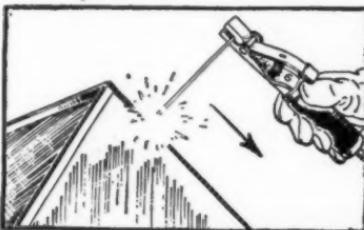
And, there's plenty going on in industry that people can be told about:

. . . new designs . . . new techniques that give the people more value for less money. For example:



**LOOK, MR. LA GUARDIA,** how manufacturers are stepping out in front with the world's leading welding electrode:

## "Cooking" with *Fleetweld* . . .



**Going downgrade 33% faster.** This fabricator was welding corner joints in 18 gauge galvanized steel at an arc speed of 30" per min. At the suggestion of the Lincoln Engineer, he started tilting the joint 45° and welding downhill with "Fleetweld 35". Increased speed to 40" per min. . . 33% faster.



**Jigging up for 16% lower cost.** Use of jigs to improve fit-up of parts and positioners to get downhand welding usually permits use of larger electrodes. In welding of this tapping machine frame, electrode size went from 5/32" to 3/16" "Fleetweld 7". Welding cost went down 16%.



**Using "arc force" to boost speed 20%.** Fillet welds in flat and horizontal positions are being made with 1/4" "Fleetweld 11" and "Fleet-Fillet" Technique at arc speeds of 12" per min. where former method gave 10" per min. This mining machine transmission case is a typical application. Full details in Bul. 444.



**The sign of good "cooking".** When you see 3 DOTS on an electrode, you know you have genuine "Fleetweld" . . . the world's leader for **low cost, speed and quality**. New, handy pocket manual giving procedures for all kinds of jobs free on request. Ask for Bul. 437.

**New Lincoln sound-color movies available free for showing to groups.  
Write for information.**

**THE LINCOLN ELECTRIC COMPANY • DEPT. 502 • CLEVELAND 1, OHIO**

*America's greatest natural recourse*

## **ARC WELDING**

**Eliminates outside piping...**

**"GUSHER"  
FLANGE MOUNTED  
INTERNAL DISCHARGE  
COOLANT  
PUMPS**



**MODEL 11020A**  
Flange Mounted  
Internal Discharge

Designed to fit into small space and eliminate outside piping, patented Gusher Flange Mounted Internal Discharge Coolant Pumps can be installed on the machine base for improved performance and appearance.

Available in a variety of models, long or short, with discharge through center of intake or to right or left of intake in flange, 1/10 to 2 HP motors, they contain all the features which have made Gusher Pumps universally accepted throughout the machine tool industry.

*Write now for New Condensed Catalog.*

**THE RUTHMAN MACHINERY CO.**

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THE "GUSHER"

A MODERN PUMP FOR MODERN MACHINE TOOLS



# When the tap's in the fire . . .

This "Greenfield" man is measuring heat with as much precision as though he were using a micrometer to measure size. He is using an optical pyrometer. On his technical skill depends to a large degree the performance of the finished product in your plant. Improved furnaces, precise heat measuring devices, and the continuing accumulation of "know-how" have made the heat treating of tool steels an exact science in "Greenfield" plant.



It is a science that contributes much toward your getting *more for your money* when you use "Greenfield" tools and "Greenfield's" "Show-How" field service.

**GREENFIELD TAP and DIE CORPORATION**  
GREENFIELD, MASSACHUSETTS

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In at least two fundamental engineering design features Atlas drill presses provide extra values that production and tool men thoroughly appreciate.

1. The "floating drive" spindle design — with 4 large SKF ball bearings — assures smoother operation and less wear on long continuous use.

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Ask your Atlas distributor to give you full details about the two bench models, the sturdy floor model with production attachments, and the 2, 3, and 4 spindle models.

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**TOOL TEAM**  
FOR  
**SMALL-PARTS MACHINING**



# Maximum *Performance*

PRECISION  
TAPS, GAGES, GROUND  
FROM

*THE SOLID . . . LET US SEND YOU DETAILS . . .*

*John Bath & Company, Inc.*

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## BATH TAPS

Maximum performance can be expected from these precision built BATH taps. Performance is the ultimate goal and ever present factor in the production of BATH taps. For this reason only the finest material, scientifically processed go into BATH taps - this together with precision workmanship and years of experience assures the unexcelled performance received from BATH taps.

# FOR HIGH SPEED OPERATION



## TWO New STANDARD CUT-OFF OR GROOVING TOOLS!

Designed especially to meet the increased production requirements of today.

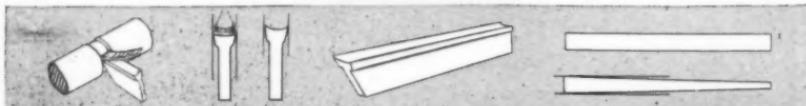
1. Tungsten carbide tipped—for greatest efficiency at fastest cutting speeds. Recommended for hollow work.
2. Emprise—a newly developed material that brings higher efficiency to that range between high speed and carbide. Particularly recommended for tough jobs that ordinary blades will not take.

These blades incorporate all the outstanding features that characterize the Luers Blades—the T-shaped design that provides for necessary clearances on all sides, and the exclusive hollow-ground top—all of which eliminate excessive friction.

Empire Tool Co. manufactures Luers Patented Cutting-off Blades and Holders under license issued by John Milton Luers Patents, Inc.

**EMPIRE**  
TOOL COMPANY

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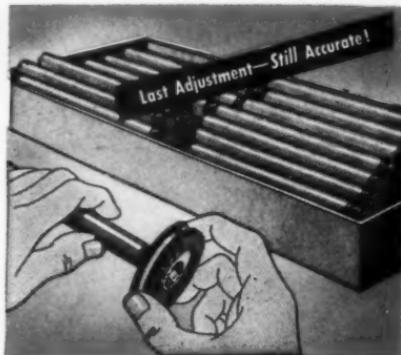
The ragged edge shown above was the result of using ordinary blade—the blade was pushing not cutting, and caused the tube to collapse before it could cut.



When Emprise blades were used on the same material a clean cut resulted. Twenty-five times as many cuts were made before re-grinding of blade was necessary.



This part was produced most efficiently through the use of 19 Empire Cut-off Blades set in a special gang holder.



## Amazing Adjustable Thread Ring Gage

*Starts round*



*Stays round*



### 5-PLUS FEATURES

- 1 Accurate and stable
- 2 Long wear life
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A NEW WAY to cut inspection costs—  
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The design of this gage gives you long life accuracy, never before possible with conventional thread ring gages. Because of the accuracy, gage life is increased many times. One large plant is getting 12½ times longer service than with the old style gages.

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PRECISION GAGES • PRECISION MACHINED PARTS • DIAPHRAGM CHUCKS • ADJUSTABLE CLAMPING JIGS • SPECIAL TOOLS



*This ALCO Drill Chuck has saved us a lot of money since we stopped using old-fashioned bushing holders*

## ALCO DRILL CHUCK

"This modern ALCO Drill Chuck has made it possible for us to meet some of the toughest production schedules we ever had to face.

"When we equipped our screw machine department with ALCO Holders, it was the smartest move we ever made, and one of the biggest savings was in eliminating our bushing inventory; because these ALCO Holders have a tight grip without using bushings.

"We only need a comparatively few of these tools to do all our work for we use the same ALCO Chuck to hold drills, counter bores, reamers and spotters.

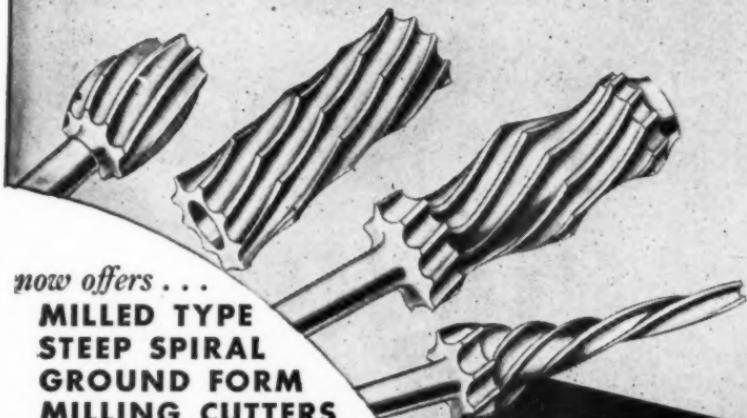
"One thing which makes these tools outstanding is the adjustment for concentric drilling or reaming. Even on our old machines, we turn out perfect work and have no rejects because of this concentricity."

Write for new catalog No. 6

# ALCO TOOLS

THE ALCO TOOL CO.  
252 Birdseye St., Bridgeport, Conn.

# MOTOR TOOL has done it again!



*now offers . . .*

## MILLED TYPE STEEP SPIRAL GROUND FORM MILLING CUTTERS

*developed to exactly  
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Steep spiral, milled type ground form milling cutters have not been produced in the past because no simplified means previously has been perfected for keeping them SHARP.

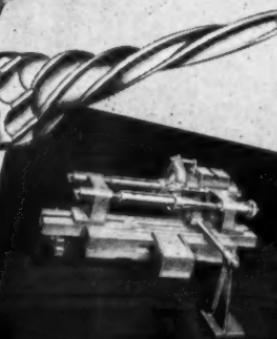
Now—MOTOR TOOL has developed a fixture for standard cutter grinders that keeps them razor sharp and true.

As a result we are in a position to design and build such cutters up to and including 30-degree angle, right and left hand—with radii and angles of forms in either arbor or shank type construction.

Mail us blueprints of parts you want to mill. If arbor type, specify size of hole. If shank type, indicate shank dimensions. Price and delivery date will be promptly furnished.

*Plus*

*a Means of Keeping Them  
SHARP • FORM CONSTANT • TRUE  
We do not advocate purchase of this  
NEW sharpening fixture unless you  
have sufficient volume to keep it busy.  
We will sharpen your cutters for you.  
24 hour service if the need is urgent.*



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METAL CUTTING TOOLS  
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Strand Flexible Shaft Machines have answered the call for portable, rotary power with efficiently designed, solidly constructed flexible shaft machines that insure constant speeds with dependability and greater operator convenience.

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*Now gives you*

- **EVEN MORE** pieces between grinds
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*Improved*  
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CEMENTED CARBIDE

For years, TECO Cemented Carbide has consistently outproduced other carbides. Today's *Improved* TECO is much better in every way. New techniques in manufacture and rigid control of critical metallurgical processes, bring you increased hardness and toughness with greater resistance to breakage and wear. Result? Far greater production, at lower cost . . . substantiated in actual machining practice, on a wide range of work.

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*Improved* TECO Cemented Carbide Tools and Blanks are available for immediate shipment, in all standard styles and sizes. Have a tool engineer call—or send for latest catalog and price list.

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# TOOLS for PRECISION PRODUCTION

Reciprocating Action (In and Out)

## PORTABLE Electric RECIPROCATING TOOL

Motion is "in and out"—not spinning or rotary. Tool is portable—light weight—carry it anywhere—easy to handle. Self contained. Ready to plug into any 110 volt electric outlet. Use it to work on any metal, wood, plastic or other materials that may be filed, sawed or polished. Delivers 1000 strokes per minute, much faster than hand methods. Complete line of files, scrapers, hones and other accessories available.



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THE ONLY AIR GUNS WITH ENCLOSED LEVER CONNECTED TO THE VALVE BY A BALL AND SOCKET JOINT.

Valve completely enclosed. Eliminates Packing Glands.

Slight movement of lever gives complete discharge.



Features that make it the choice of the most modern plants—

- Leakproof.
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## PRECISION BUILT SMALL REAMERS High Speed and Carbide Tipped 1/32" to 5/8" Diameter

If you are finishing holes to decimal tolerances or ANY part that calls for extreme reaming accuracy, we are especially equipped to produce the reamers required: Straight, Spiral, Step, Pilot, Hand.

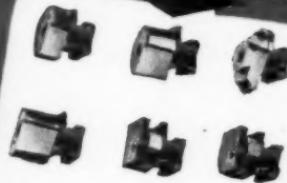
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**P**  
PRECISION  
PRODUCTION  
TOOLS

# ACME TOOL COMPANY

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# VERS-O-TOOL uses these circular cutters



for  
THREADING • END FORMING  
END TURNING • NECKING  
KNURLING • BURNISHING  
CHAMFERING  
COMBINATION THREADING  
AND TURNING

Here is a modern tool that is just as flexible and adaptable as a brace and bit.

In this hardened and ground, simply-constructed head, you can insert a variety of circular chasers for threading, or change quickly to circular cutters for end forming, end turning, chamfering, knurling, burnishing or combination threading and forming.

You can replace chasers or cutters in

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If you're not already using Vers-O-Tools you may be overlooking many opportunities to reduce costs two ways—in tool investment and in more production per hour.

*Catalog D-42-C will give you all details*

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Acme-Gridley Bar and Chucking Automatics:  
1-4-6 and 8 Spindle • Hydraulic Thread  
Rolling Machines • Automatic Threading Dies  
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# The Improved Meyers

**Radiform**  
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**FORMS CARBIDE TOOLS — OR HIGH SPEED TOOLS**

**- WITH EASE  
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*Radiform set up to generate 3/16" concave radius on a carbide tool bit.*

With the Improved Meyers Radiform, you can generate the form directly on tool bits, end mills, milling cutters and similar tools of high speed steel or carbide without first forming the wheel . . . and you can also form the grinding wheel itself. Micro-inch finish, with predetermined contours and clear-

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will find the Parva-graph an indispensable tool. Compact, versatile, it can be kept on desk or hung over work bench -- handy for instant use when needed -- always ready to serve as a French Curve, Dividers, Protractor, Triangle, Ruler, Compass, Mitre, Letter Weigher, Magnifying Glass, Spirit Level, etc.

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**SQUARE**  
PLUS 10c POSTAGE

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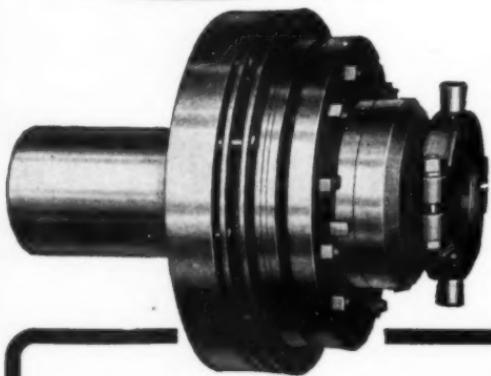
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OF  
*Better Buys* BETTER



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*The March of Progress of Conway Clutches is toward improvements to make it even more advantageous for you than ever . . . and now you get*

**LARGER CLUTCHES  
IN SEVERAL SIZES**

**INTERCHANGEABLE PARTS**

**STANDARDIZED PRODUCTION  
OF UNITS**

**BETTER DELIVERIES ON STANDARD MODELS NOW IN  
PRODUCTION**

*Patented in U.S.A. and Canada*

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*(Illustrated is Series 550)*

Designed to function in transmitting power as the fuse does in transmitting electric current. Can be set to transmit any torque from nothing to its rated capacity and will keep setting even after adjustment for wear is made. The clutch transmits the load allotted to it until an obstruction or excessive torque is encountered. Then the clutch slips for one-half a revolution and automatically disengages itself. When the cause of the excessive torque is removed, the clutch can be engaged again and production resumed. If desired, the clutch can operate a limit switch.

*Write for Bulletin S 10*

# THE CONWAY CLUTCH co.

1541 QUEEN CITY AVE.

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GRAND RAPIDS GRINDING MACHINES



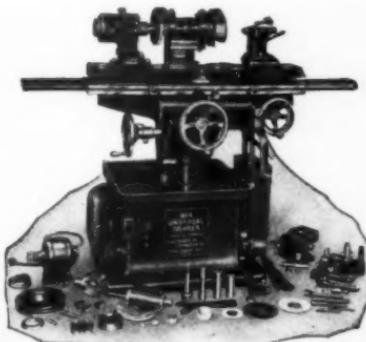
Grand Rapids Combination Tap & Drill Grinder No. 10-B

**DELIVER  
TOP TOOL ROOM  
EFFICIENCY**

Whether you need a Universal Cutter and Tool Grinder or a Combination Tap and Drill Grinder, you can be sure of top tool room efficiency if they bear the name "Grand Rapids," manufactured by Gallmeyer & Livingston Co.

With the Combination Tap and Drill Grinder you have three ways: 1. On first cost, 2. Through lower maintenance expense, 3. On valuable floor space.

With Grand Rapids No. 4 Universal Cutter and Tool Grinder you can handle complex tool grinding jobs with maximum speed and convenience. Write now for bulletins 1045 and G. L. 9-15-44.



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**What "GRAND RAPIDS" Quality Means:** Gallmeyer & Livingston cast their close-grained gray iron, machine to micrometric tolerances, precision-assemble grinding machinery of unsurpassed performance. *Grand Rapids* means top quality in grinding machinery.

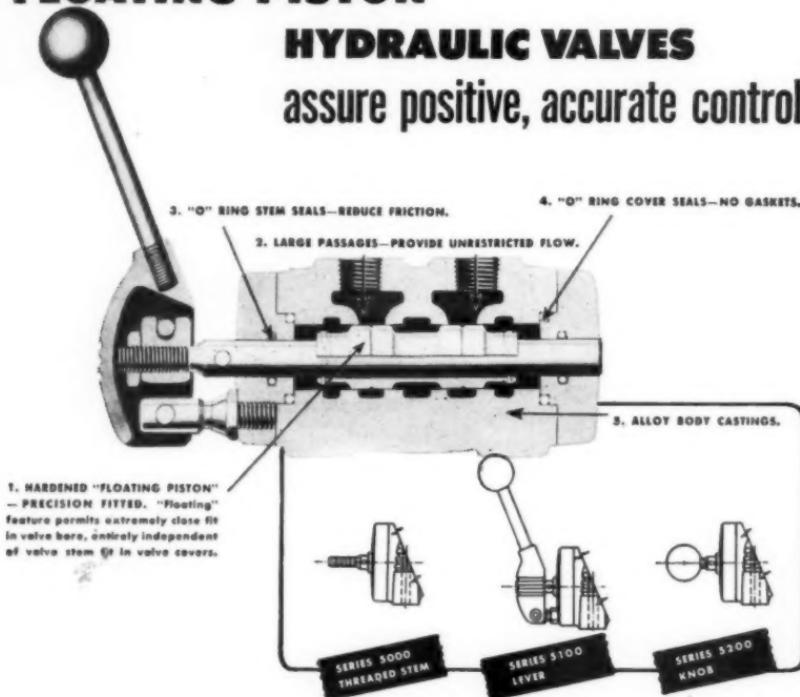
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## HYDRAULIC VALVES

assure positive, accurate control



For dependable oil service, involving pressures up to 3000 p.s.i., specify Gerotor "floating piston" 4-way hydraulic valves. They are made in seven sizes with five different piston designs, meeting the requirements of any hydraulic circuit. Available methods of operation are: Hand, Foot, Cam, Solenoid, Oil Pilot Pressure, and Air Pilot Pressure.

Advanced design, efficient operation, expert manufacturing . . . these are characteristics of every hydraulic valve by Gerotor.

**GEROTOR MAY CORPORATION • Baltimore 3, Md.**

# Featured In This Issue

PRECISION MEASUREMENT was a vital factor in war production. It gave us size standards which permitted interchangeability of important machine parts. In a series of articles which started last month, Warren Baker will review the whole field of precision measurement, describing the different gaging and measuring instruments and telling how they are used and maintained. These articles will be worth keeping for future reference, and the second installment of the series commences on page .....129.

ROTATING Handles and Knobs are used to advantage in many parts of machine tools. Some of the more common of these applications are described by H. F. Williams in the story commencing on page .....159.

CARBIDE DIES are being used in increasing numbers. There are many reasons why this is so. Some of the outstanding advantages are discussed by Earle Glenn of the Carboloy Company. He tells how and why carbide may be used to advantage in certain typical applications in the story commencing on page .....187.

GEAR INSPECTION and some of the modern methods of handling such work are analyzed by Don Moncrieff. Typical gear inspection equipment is listed and described in a story commencing on page .....199.

KNOWLEDGE of any topic under discussion is essential so you can drive home the important points. The importance of knowing just what you are talking about is emphasized in the current installment of the Foremanship Forum, starting on page .....213.

SAFETY should keep pace with Production. This important topic is discussed by John E. Caldwell Jr., in a story commencing on page .....231.

TEN MILLION DOLLARS worth of machine tools for one manufacturer tells about plans for building the Tucker Torpedo Car in the Dodge Chicago plant. See page .....245.

MILLING has made some recent advances. These advances for the most part have involved the use of carbides in hyper-milling, particularly with removable blade milling cutters. Dr. H. A. Frommelt of the Industrial Research Div., Kennametal, Inc., reviews these developments in Kennamilling in a story commencing on page .....261.

DEBURRING can be handled advantageously with power brushing equipment—particularly on jobs similar to those considered in the story commencing on page .....273.

REQUIREMENTS for machine tools are discussed by J. R. Weaver in a story commencing on page .....279.

"WHAT'S NEW" introduces the monthly parade of new equipment and new tools. See page .....286.

TAX PROBLEMS are discussed by Art Roberts. His topics include Venture Capital and Borrowed Capital; see page .....295.

LET'S TALK SHOP offers some items of particular interest to shop men. See page .....321.

MECHANICS PICTURE PAGE .....374.

# SOUTH BEND

## Precision Lathes

**RUGGED  
ACCURATE  
DEPENDABLE**

The rugged construction of South Bend Precision Lathes is best demonstrated by the fact that the great majority of all South Bend Lathes ever made still are giving satisfactory service after years of daily use. Their rugged construction explains why, even after many years of service, they continue to produce toolroom and production work to close tolerances. It explains why they have earned for themselves a reputation for dependable performance in all types of installations. Because of their rugged construction, lifetime accuracy, dependability and unusual versatility, you will find it to your advantage to specify South Bend Precision Lathes for your next installations. Write today for Catalog 100-D which illustrates all South Bend Engine Lathes, Toolroom Lathes, and Turret Lathes.



LATHE BUILDERS SINCE 1906

**SOUTH BEND LATHE WORKS**  
426 EAST MADISON STREET • SOUTH BEND 22, INDIANA



# *As The Editor Sees It*

---

## ENCOURAGE INITIATIVE

WE read a yarn the other day about a Mr. Jones who died and went on. After the usual formalities, he was shown to a beautiful furnished home in which he was to live. He decided to rearrange the furnishings a little more comfortably. When he did, a guardian appeared and stopped him with the admonition "That is the way we have kept this furniture for centuries, don't you change it now."

Jones went out into the garden, he saw some weeds and was just about to pull them up when the guardian appeared again. "That, my man, is the gardener's job, not yours."

Jones finally decided he'd have his dinner and with the thought, lo and behold, a tray of food appeared before him, including some nice sliced, raw onions. It so happened that raw onions didn't agree with Jones so he called the guardian and ordered the onions fried. "No Mr. Jones, you eat them the way they are and like them," that worthy informed him. Then Jones got mad, put on his hat and as he was leaving, said to the guardian, "If this is any sample of Heaven, you can have it." "What gave you the idea, Mr. Jones, that this was Heaven?" replied the guardian.

How many employers stifle initiative with this "guardianship" type management? A sensible measuring stick for the degree of success of your managerial supervision is the amount of initiative you stimulate in your workers. The word initiative taken literally means the ability for original conception and independent action. In reality, initiative means the stuff out of which ideas, short cuts, and improvements are made. In any business, such initiative is indispensable. The question you should ask yourself is, are your employees permitted to use their initiative or does too much guardianship prevent their being interested in passing on their ideas to you?

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# Sometimes a different shape determines better grinding



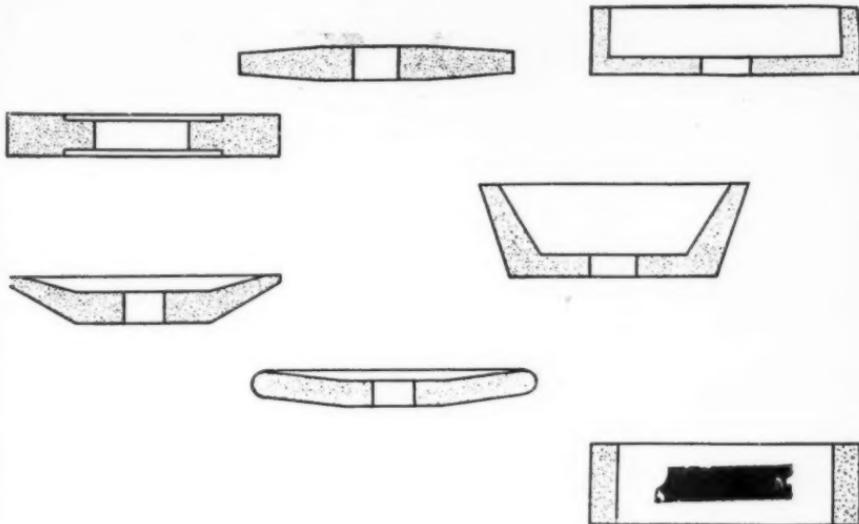
In terms of grinding wheel life, as well as efficiency and economy—the wheel shape selected for a specific operation is worth careful consideration. This is equally true for both production operations and tool-room grinding.

To help you check your grinding opera-

tions...to assist in selecting the best combination of shape, grit, grade and bond, follow the simple plan of many top notch production men. Consult with your CARBORUNDUM salesman or our distributor's representative. Many customers consider his opinions of real, practical value. His suggestions are based on a

*A good rule for good grinding... CALL*





knowledge of abrasive developments . . . supported by daily experience with plenty of on-the-job grinding applications. If the problem is unusually difficult, the CARBORUNDUM representative may call in an Abrasive Engineer for consultation. Both representative and Abrasive Engineer have available to them the facil-

ties and resources of the world's most noted abrasive laboratories.

Through this single practice, of calling in CARBORUNDUM, you can be sure of getting maximum efficiency from your grinding wheels and other abrasive products. The Carborundum Company, Niagara Falls, New York.

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TRADE MARK

## BONDED ABRASIVES

### WHEELS

- Silicon Carbide
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- Cylinder Hones
- Sticks, Stones & Rubs
- Specialties

## COATED ABRASIVES

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- Sheets, Rolls, Discs

## ABRASIVE GRAINS AND COMPOUNDS

- for:
- Polishing
- Lapping
- Pressure Blasting
- Finishing

*"Carborundum" is a registered trademark which indicates manufacture by The Carborundum Company.*

**Bars of A4615, like all Ryerson Alloys, are unmistakably identified by color marking and heat symbol. When transferred to the Ryerson Alloy Report, marking and symbol give a positive cross check between steel and accompanying hardenability data.**



## **Now back in Ryerson Stocks**

### **A4615-A4140 and other prewar alloys**

Old friends, the alloy steels for which Ryerson stocks were distinguished in the days before Pearl Harbor, are back from war. They have been at the front for more than four years but now their special war jobs are finished and these steels are again available to everyone for prompt shipment from eleven Ryerson plants.

Of course the wartime triple alloys which proved satisfactory have been adopted as standard AISI steels and continue in Ryerson stocks. Both prewar and triple alloys in a wide range of sizes make your nearby Ryerson plant the ideal source for every alloy requirement.

In addition, Ryerson alloy service provides the advantages of the Ryerson Certi-

fied Steel Plan, featuring a time-saving Alloy Report with every shipment. The chemical analysis, heat treatment response and recommended working temperatures included in the report are a helpful guide for designers and heat treaters, a reliable record for purchasing men.

Diversified stocks plus the quality assurance of the Certified Steel Plan are two reasons why more manufacturers depend on Ryerson for alloy steel from stock than on any other source. Whatever your alloy requirements, let Ryerson specialists work with you to supply the steel you need, when you need it. Call, wire or write the nearest Ryerson plant.

**Joseph T. Ryerson & Son, Inc., Plants at: Chicago, Milwaukee, Detroit, St. Louis, Cincinnati, Cleveland, Pittsburgh, Philadelphia, Buffalo, New York, Boston.**

# **RYERSON STEEL**

## PRECISION MEASUREMENT



By  
**WARREN BAKER**

### Section I — Part 2 — Inspection Instruments, Continued

THE full use of gage blocks was delayed for many years by the lack of development of suitable accessories to make possible their application directly to all sorts of measuring problems. For years after gage blocks were introduced in this country and used as the standard of precise measurement, they were still largely reference instruments.

In the opening chapter the reader was given a summary of the types of gage blocks available today and the kinds of material of which they are made. In this installment we shall consider accessories now available that have put true precision in the field of direct measurement, making gage blocks

as versatile and handy to use as the machinist's rule that everyone used to carry in his pocket.

#### Gage Block Accessories

Most manufacturers of gage blocks now offer with their sets some sort of accessory devices that will enable the production inspector, at least, to apply the blocks to direct measurement problems. Among the earliest and simplest of these were such devices as the tram or center points designed to fit on the ends of gage blocks or gage block stacks as shown in Figs. 1 and 2.

Clamps or holders to make the wrung combinations more secure and stable

Warren Baker, M.S., Ch.E., author of the current series of articles on measurement in *The Blue Book*, has been writing on technical and scientific subjects for 25 years. He is a one-time automotive engineer whose work more recently has taken him principally into the fields of precision instruments, powder metallurgy, and the hard carbides, the latter two a return to his first love as a chemist.



He has written a number of training and study courses, among them the "Science of Measurement," produced for the DoAll Trade School, DesPlaines, Ill. He also is co-author—with Prof. J. S. Kozacka—of "Carbide Cutting Tools," a textbook on carbides currently being produced by the American Technical Society. Under way also is a textbook on powder metallurgy.

Mr. Baker has just retired as executive editor of *Science and Mechanics* magazine, where his work led him ever deeper into the intricacies of presenting technical and scientific subjects to the lay—and even the untrained—mind. He is a former Associate Editor of *Popular Mechanics* magazine; a war correspondent in the conflict just ended; and is the managing partner of the Model Engineering Co., Chicago.

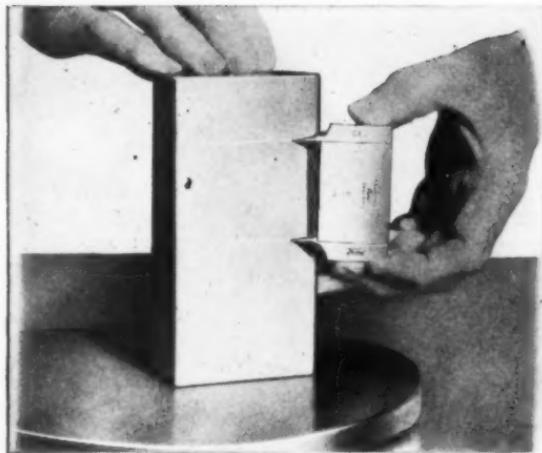


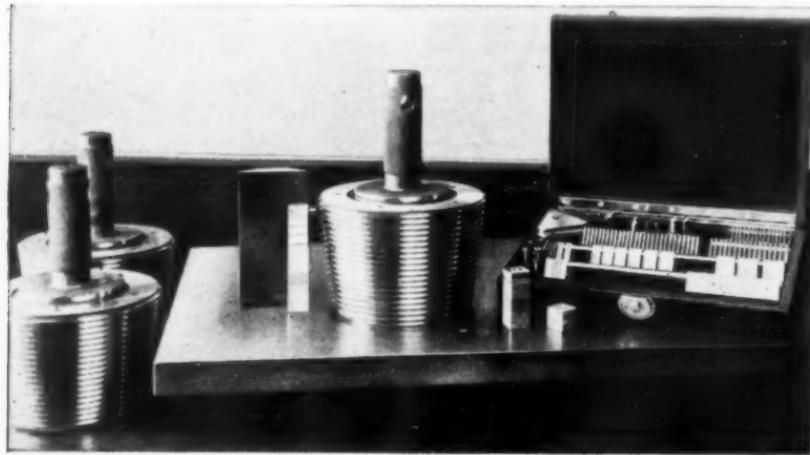
Fig. 1—Center, scribe, or tram points often are used directly on a gage block stack for direct measurement or layout work.—(Ford Motor Co. photo).

also were developed, probably as the result of the custom followed by many inspectors of sticking their stacks together with Scotch tape, (see photo) thus making often needed combinations readily available without going thru

the process of wringing the blocks. It might be pointed out right here, however, that the practice of keeping wrung combinations standing for days or weeks at a time is not one to be recommended.

A common custom of using thin gage

Fig. 2—A center point on a stack of gage blocks finds many applications in the inspection of threads and gears.—Photo by Pratt & Whitney division, Niles-Bement-Pond Co.)



# 4 FUNDAMENTALS

GIVE THESE CUTTERS THEIR SUPERIORITY

- 1 CORRECT DESIGN
- 2 SELECTED MATERIALS
- 3 ACCURATE MANUFACTURE
- 4 SCIENTIFIC HEAT TREATMENT

Use Brown & Sharpe Cutters to Maintain Your Production Schedule

STYLES AND SIZES FOR MOST REQUIREMENTS  
Catalog on Request



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*... We urge buying  
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# BROWN & SHARPE CUTTERS



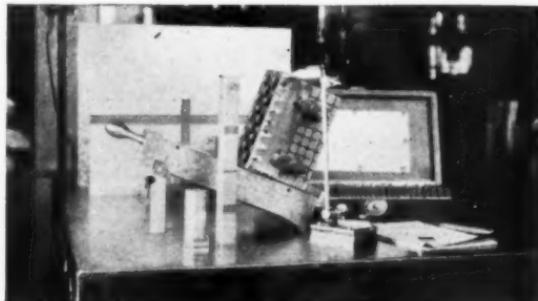
blocks on the ends of combinations as caliper bars, as shown in Fig. 3, brought about the introduction of caliper bars and wear blocks for this purpose. For measuring inside dimensions the caliper bars are placed on the outside of the stack, as shown in Fig. 4, while for measuring outside dimensions they are placed on the inside, as in Fig. 3.

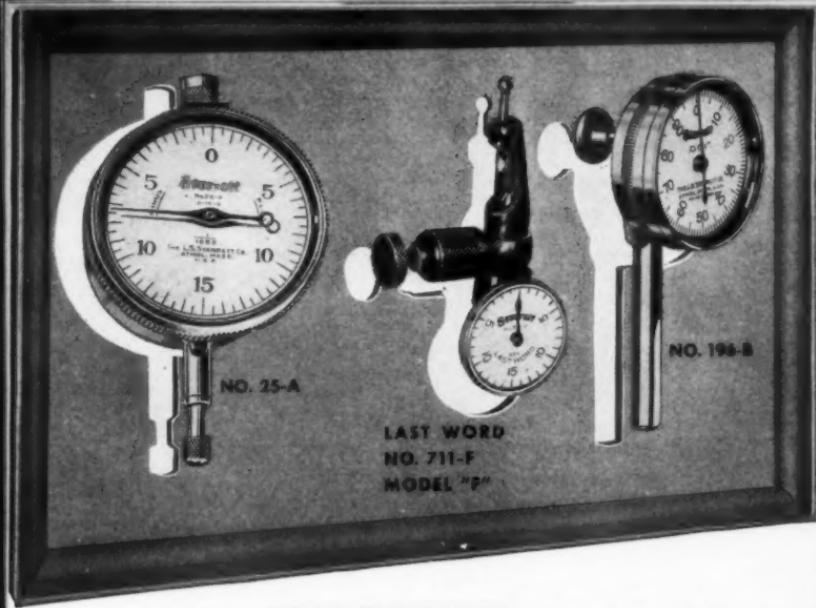
Finally came the introduction of adjustable holders and clamps of various

designs, a typical set of which is shown in Fig. 5, and base blocks (Fig. 6) to which the holders could be attached for all sorts of height gage applications. These often were put together in kits such as that shown in Fig. 7, which may or may not have included such important adjuncts to gage block use as parallels and straight edges.

One manufacturer now has introduced a kit so complete that almost any

Using sine bar, gage blocks, and gage block accessories to measure an angle. (Photo from Pratt & Whitney division, Niles-Bement-Pond Co.)





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Fig. 3—Using thin gage blocks on the ends of stacks as caliper bars brought about the introduction of caliper bars.—(DoAll Co. photo)

production gaging problem can be met with its use and many tool inspection jobs likewise are made simpler and handier thru its employment. This kit is shown in Fig. 8. It includes not only the usual gage block holders, caliper bars, pointed instruments and base

blocks, but a toolmaker's flat, a master square, round caliper bars of various diameters, parallels, stop plates, a 5" sine bar, and three dial gages with all the fittings to attach them to gage block holders or base blocks.

While, as stated earlier, the kit is de-

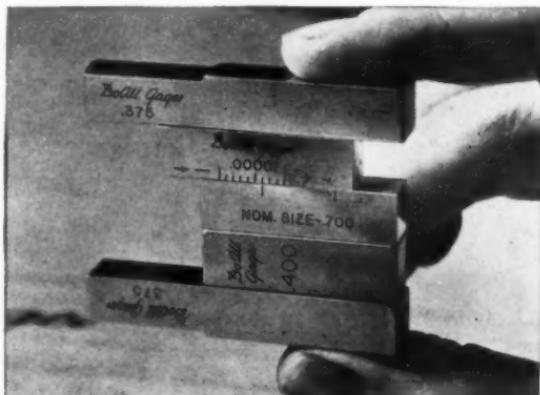


Fig. 4—Caliper bars on the outside of a gage block stack for direct measurement of internal dimensions. (DoAll Co. photo).

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This bulletin gives basic information and technical data about S.S.White flexible shafts and their application.



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Fig. 5—Adjustable holders of various lengths were next.—(DoAll Co. photo)

signed primarily for the production inspector to bring gage block accuracy and versatility to the many problems solved heretofore, at considerable cost, by the multitude of fixed gages called for in most production plants, it finds favor also with many tool inspectors in shops where tolerances are not held to the utmost possible minimum.

In combination with the "mobile unit" shown in Fig. 9 which this company also makes and which includes comparator, optical flats, surface plate and the many other instruments commonly found only in laboratories, it is possible to take the tool inspector to the tools, instead of the tools to the inspector, a practice which is gaining

much favor in many plants where absolute standard conditions of temperature and humidity are not called for in the daily grist. With the new accessory kit, the company's new "Lifetime" gage blocks, pictured in the previous installment, and the mobile unit, the tool inspector can take his "laboratory" right with him on wheels anywhere in the plant and have everything at his command save an air conditioned room.

Thus have gage blocks developed, thru accessories, from the simple, easily transported standard of measure they were at the outset, to practical, usable, handy, everyday instruments of direct measurement. Some of the applications to common problems are shown in the



Fig. 6—Base blocks added to versatility of these tools.  
(DoAll Co. photo).



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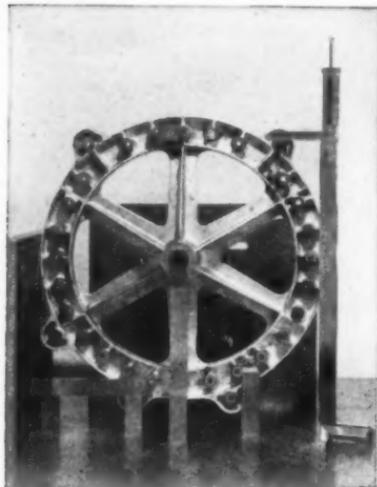
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A magnifying light is a help in many inspection procedures. (DoAll Co. photo).

Inspection setup of a relation gage, using gage blocks and accessories developed for them. (Ford Motor Co. photo).



photos which carry no figure numbers. Detailed explanations of these uses are reserved for Section II of this series, when actual inspection methods will be considered.

#### Building Combinations

To build up any dimension with gage blocks, the first consideration is to use as few blocks as possible. This reduces the possible error of the stack and also, in tool inspection work, it reduces the number of blocks you must check against the inspection sheet and add



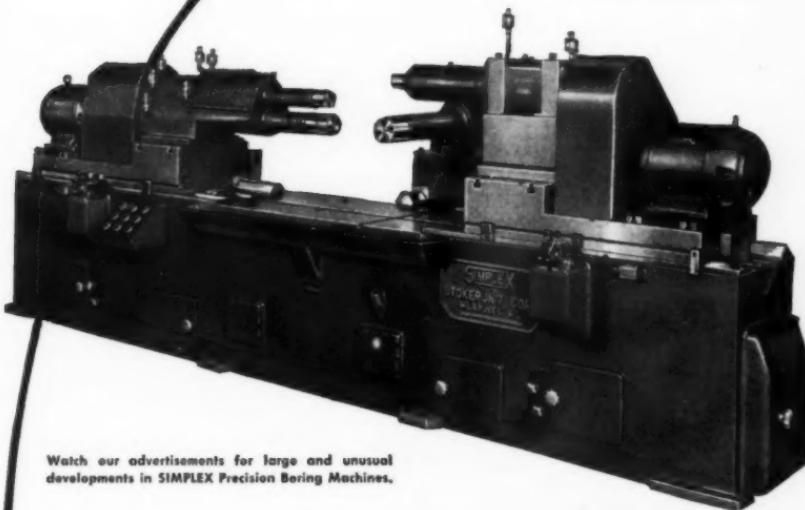
Dial Indication Height gage compares dimension with gage block stack. (algebraically) together for the total plus or minus error.

The second point to be remembered is always to work from right to left of the decimal. In other words, take off the last figure in the dimension sought first. If you can use a large block to accomplish this purpose, so much the better. For instance, should you wish to build up a combination of, say, 3.4817", you must first eliminate the 7 on the right end.

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Fig. 7—A typical kit of gage block accessories. (Ford Motor Co. photo).

In the ten-thousandths series of blocks in the standard 81 piece set, there is a block measuring 0.1607 between faces. This from 3.4817 leaves

3.381. To eliminate the 1, then, use the 0.131 block in the thousandths series. The reason for not using the 0.111, the 0.121, or the 0.141 block is evident at

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Fig. 8—An accessory kit that meets almost every need of the production inspector and many of those met in the tool room. (DoAll Co. photo).

once when it is seen that the result with the 0.131 block is 3.250. The 0.250 block then removes two decimals at once, leaving the 3. The 3" block com-

pletes the combination.

Now let us suppose you need a second stack of the same total dimension for a check. To eliminate the 7 at the



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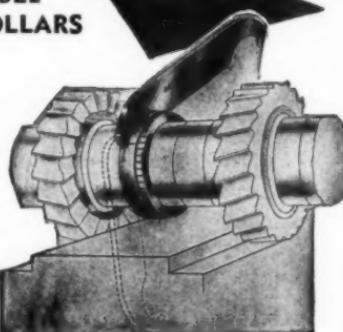
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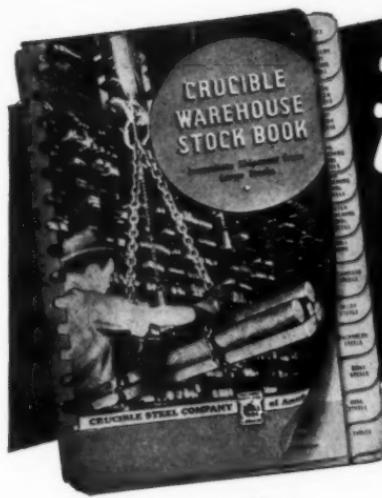
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Fig. 9—This mobile laboratory lets the inspector go to the tools anywhere in the plant. (DoAll Co. photo).

end, you can use either the 0.1003 plus the 0.1004, or the 0.1005 plus the 0.1002. Again, then, you will take any block in the thousandths series to eliminate the 1, either the 0.111, the 0.121, or the 0.141 (you have already used the 0.131). In this case you go back to the original rule and use the largest, the 0.141. The 0.140 block then removes the last 4 and the 2" and the 1" blocks complete the stack. Until you become accustomed to

working out the combination in your head, a tabulation on paper will help. Many experienced inspectors find such a tabulation an aid, if only to prove their results. To work out the combination and prove it at the same time, the tabulation takes this form:

	To Prove
Dimension sought .....	3.4817"
Eliminate last 7 with.....	0.1007
<hr/>	
Result .....	3.381
Eliminate the 1 with.....	0.131
<hr/>	
Result .....	3.250
Eliminate 250 with.....	0.250
<hr/>	
Result .....	3.
Eliminate 3 with .....	3.
<hr/>	
Result .....	0.0000
	3.4817"

In the right hand column, then, you set down the dimension of each block as you subtract it from the previous result, and adding the right column gives you the original dimension, if you are correct.

Taking the second combination considered heretofore, the tabulation works out this way:

	To Prove
Dimension sought .....	3.4817"
Eliminate the 7 by wringing 0.1004 and 0.1003 .....	0.2007
<hr/>	
Result .....	3.281
Eliminate 1 with .....	0.141
<hr/>	
Result .....	3.140
Eliminate 140 with .....	0.140
<hr/>	
Result .....	3.
Eliminate 3 .....	3.
<hr/>	
Result .....	0.0000
	3.4817"

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Fig. 10—A "complete" or "master" set of 118 gage blocks. (DoAll Co. photo).

To make certain the method is understood thoroughly, let us take another practice dimension: 4.6879". The tabulation:

Dimension sought	.....4.6879"	To Prove Result
Eliminate the 9	.....0.1009	0.1009
Result	.....4.587	
Eliminate 7 with largest block	.....0.147	0.1470
Result	.....4.44	
Eliminate 4 with	.....0.140	0.1400
Result	.....4.3	
Eliminate the 3	.....0.300	0.3000
Result	.....4.	
Eliminate the 4	.....4.	4.0000
Result	.....0.0000	4.6879"

The combinations given are all possible, as are countless thousands of others, with the "standard" set of 81 pieces. The possible combinations, of

course, would be 281-1, but not all of that vast number would be usable or practicable.

#### The "Complete" Set

For the tool inspection laboratory, however, sets are available containing more than 81 pieces. These are usually termed by their manufacturers "complete" sets. These may contain, like the one shown in Fig. 10, 118 or more pieces, adding to the set of 81 such important "extras" as an 0.010 and 0.01005"; 0.02, 0.03 and so on to 0.09"; an 0.051, 0.052 and so on to 0.059"; a set of 0.0201 to 0.0209" blocks; an 0.10005"; 0.160, 0.170, 0.180 and 0.190"; and a fraction series of 1/32, 3/64 and 1/16".

These prove very helpful where decimals are to be carried to five places, particularly the fraction series. A complete fraction series, available from

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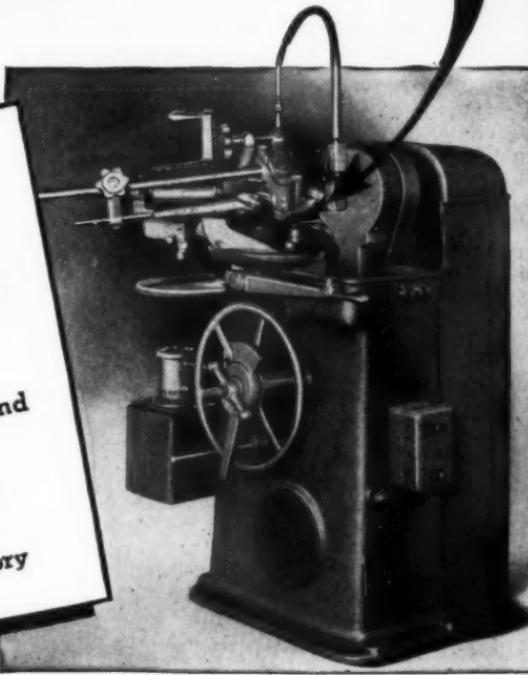
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Fig. 11—A typical set of fraction blocks. (DoAll Co. photo).

most manufacturers, is shown in Fig. 11. Inspection laboratories where tolerances are particularly fine will find the complete fraction series an often used set. A table of 6 place decimal equivalents of fractions, tacked on the wall in front of the tool inspector's bench is an essential also.

It all works this way:—Suppose the dimension 4.68793" is sought. The inspector has no decimal block that comes nearer than 5 to the 3 digit on the right end. So he seeks from the table of decimal equivalents a fraction that ends in 3. This occurs in the  $1/64$ , the  $5/64$ , the  $9/64$  and others up to  $41/64$ . (Actually these are 6 place decimals ending in 25, but 3 is the nearest correct in the fifth place. An error of 5 millions of an inch is introduced by this method.

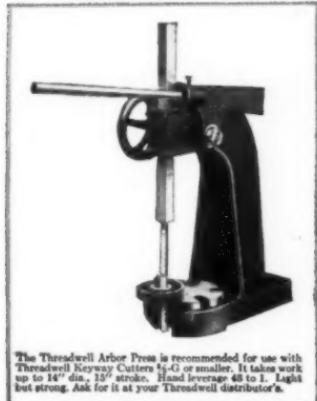
Since the inspector has, in the fraction series a  $3/64$ " block, he must start with this. He can add to it a  $1/32$ " block to make  $5/64$ " which is the simplest and easiest combination to obtain the desired end digit, but has the disadvantage that both are exceedingly thin blocks and therefore easily sprung if wrung together. It is probably best to wring up a combination that will give you the largest usable fraction,  $41/64$ ", so the thinnest blocks will not be wrung together, but will be on the ends of larger blocks. To obtain a  $41/64$ " stack, start with the  $1/2$ " block, leaving  $9/64$ ". Wring the  $3/64$ " block to one end of the  $1/2$ " block and the  $1/32$ " to the other end. Then add the  $1/16$ " block to either end and you have your  $41/64$ , or  $0.64063^3$ . (Actually,  $0.640625^2$ ).

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Fig. 12—The vernier block—(DoAll Co. photo).

In tabular form it works out like this:

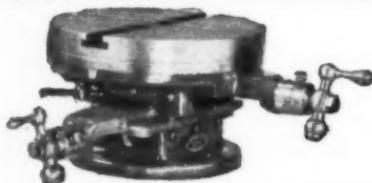
	To Prove Result	—
Dimension sought .....	4.68793"	
To eliminate 3, use stack totaling 41/64".	0.64063	
Result .....	4.0473	
Eliminate the 3 as before.	0.1003	0.10030
Result .....	3.947	
Eliminate the .47 .....	0.147	0.14700
Result .....	3.8	
Eliminate the 8 .....	0.800	0.80000
Result .....	3.	
Eliminate 3 .....	3.	3.00000
Result .....	0.00000	4.68793"

It should be noted, of course, that the 0.500" block, if available, will do

quite as well as the 1/2" one, the 0.250" instead of the 1/4", and so on. Any fifth place decimal ending on 2, 3, 5, 7, or 8 can be eliminated by this fractional method. By juggling the fractional and decimal blocks properly, a fifth place decimal ending in any digit can be eliminated. While you may not wish to wring them in that order, for the reason given earlier, i.e., their thinness, fractional blocks should be selected by taking the smallest block first, just as you remove the right digit first in the decimal. In other words, to arrive at 41/64", take the 1/32" block first, then the 3/64", then the 1/16, then the 1/2". To make the fraction end in 7 or 8 in the fifth decimal place, the 3/64" block alone is sufficient. (Actually the decimal is 0.046875, which again introduces an error of 5 millionths.)

In working with fifth place (hundred-thousandths) dimensions, this error of 5 millionths found in decimals ending in 2, 3, 7 and 8 should be taken into account in casting up the plus and minus total error of the gage block stack.

All of the foregoing discussion relating to fraction blocks is given for the benefit of those inspectors who have only the 81 piece set, together with the fraction set, available. In the "complete" sets of 118 or more pieces, the fraction blocks and decimal blocks are not duplicated. Also the addition of the 0.01005" and the 0.10005" and the 0.0201-9 and the 0.160-90" blocks re-



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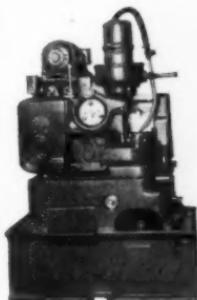
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duce materially the amount of "juggling" required.

### The Vernier Block

There is another method of arriving at fifth place decimals, however, which should be seriously considered. This is by the use of the vernier gage block shown in Figs. 4 and 12. It saves many hours and much tedium in arriving at difficult combinations, because with its use the inspector can read hundred-thousandths directly and with a magnifying light (see photo) or a jeweler's glass, can estimate closely quarters, halves and thirds of hundred-thousandths (0.0000025, 0.000005, 0.0000075 0.0000033, and 0.0000067").

The block has a nominal thickness of  $\frac{7}{16}$  of an inch, but it is divided at an angle and 10 graduations are marked so that, when the halves of the block are slipped from left to right, the height is increased by 10 micro-inches (0.000010") per gradation. The gradations are large enough so that, as noted, quarters, thirds, and halves can be read with a fair amount of ease. An inspector with excellent eyesight and judgment can come quite close to estimating actual millionths of an inch with the vernier block.

It is, without doubt, one of the handiest accessories any tool inspection department can have and its use will be recommended many times in the inspection practice installments in Section II of this series.

Assuming that the tool inspector has at his command one of the "complete" sets of gage blocks, together with the vernier block, let us now try our hand at setting up a truly complicated dimension with gage blocks. This time no holds are barred and what has gone before may be regarded as kindergarten stuff.

Just to make the problem practical rather than abstract, let us suppose that it is necessary to measure an angle to less than a second of arc with the

## COUNT 10

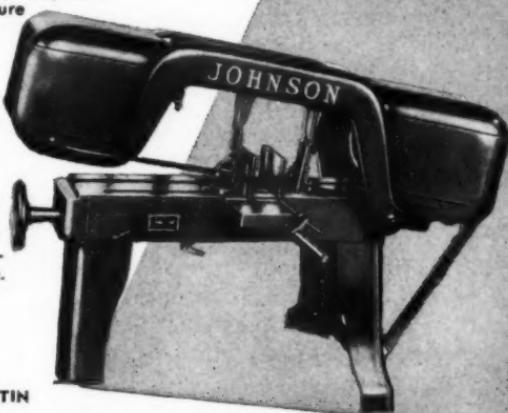
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sine bar, an instrument the functions of which will be developed in more detail in later installments. We will suppose the radius is quite short and that, to measure an angle to such exactness, the perpendicular must be known plus or minus a millionth of an inch. While in most inspection procedures the height is known and the problem is to find the error in the angle, in this case we shall assume that it is necessary to find the perpendicular. Let us suppose that a dimension of 3.46893748" satisfies the conditions.

The 48 on the end of the decimal is very nearly 50 (the error is only 2 hundred-millionths of an inch). And, in conjunction with the 7 that precedes it, it is  $\frac{3}{4}$  of 1 hundred-thousandth of an inch. Since the vernier block reads in hundred-thousandths directly, it is necessary only to slide the halves of the vernier block to the three-fourths point in either direction to achieve a reading of 750 hundred-millionths of an inch, plus or minus.

#### Other Possibilities

Suppose that the last three figures in the decimal of the dimension sought were 880, instead of 748. The vernier then would be moved 9 tenths of one gradation to the right, giving a reading of plus 900 hundred-thousandths, again an error of only 2 ten-millionths. If the last three decimals were 578, for instance, we should have to use 6/10 of a gradation as the nearest practical

substitute and the error would be 22 hundred-millionths. It will be evident that some approximation that will come within a few ten-millionths of an inch can be used thus for any seven or eight place decimal.

To wring up the dimension of 3.4689-3748" given first, however, the tabulation works out thus:

To Prove Result	
Dimension sought..	3.46893748"
Eliminate 748 by setting vernier block at 3/4 of 1 graduation, plus nominal Size of .7 .....	70000750
Result .....	2.76893
Eliminate 3 with 5/64" fraction combination (3/64 plus 1/32) ..	0.07813
	0.07812500 (actual)
Result .....	2.6908
Eliminate 8 .....	0.0208
Result .....	2.670
Eliminate 7 .....	.170
Result .....	2.5
Eliminate 2.5 (two blocks) ..	2.5
	2.50000000
Result .....	0.00000000
	3.46893250"

The dimension sought of 3.4689-325", minus the dimension arrived at, 3.4689-325", shows the error to be 0.00000498", or very nearly 5 millionths of an inch minus. In such a case the first thing to do is check all the blocks in the combination with the inspection certificate to see whether their errors, in millionths, tend to nullify the 5 millionths error already discovered, add to it, or bring it to the plus side.

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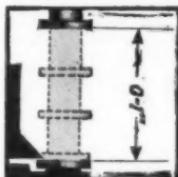
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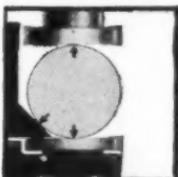
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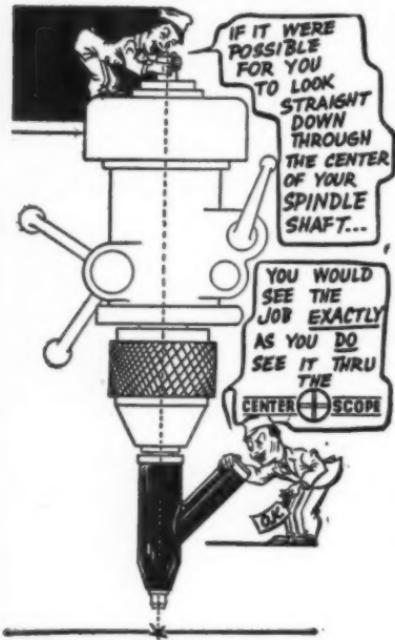
The Model 1330 P-100 has other advantages too — **The retractable anvil** makes it easier to apply, and it eliminates all excuses for marring the surface of highly finished workpieces. **It is easily adjusted to any dimension within one inch and locked in place.** **There is no lost motion.** The movement of the sensitive contact is transferred directly without error to the Dial Indicator. **The weight of the Gage and the inspector's hand rests upon the fixed or reference contact.** It is thin; only  $\frac{1}{8}$ " It is small; not over 6" at the longest point. It is light; weighs only 15 ozs. It reads in tenths (.0001"). Contacts are hard wearing Norbide (Made by Norton Co.) For more details concerning this modern snap gage write

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Let us suppose that the blocks' errors to all practical purposes average and nullify each other. We are still 5 millionths short of the required dimension. The simplest way to remedy this is to slide the vernier block another half gradation to the positive side, making it  $0.7000125"$ . This makes the dimension of the gage block stack then  $3.468925"$  and makes the error  $0.00000002"$  or 2 hundred-millionths of an inch, a negligible quantity.

On the other hand, let us suppose that the total error of the other blocks is 5.2 millionths of an inch on the plus side. Subtracting the error found first from the known error of the blocks, we find the total error is  $0.00000004"$ , again one of no consequence. But suppose the certificate shows that the known error in the blocks totals to 7 millionths minus. This, added to the 4.98 millionths we are already short makes a total minus error of nearly 12 millionths, which cannot be allowed. In that case, the vernier block is moved to the right of center another 1.2 or  $1\frac{1}{4}$  gradations, and the error again is neutralized within a few hundred-millionths of an inch.

(The next installment will take up the uses and interpretations of optical flats.)

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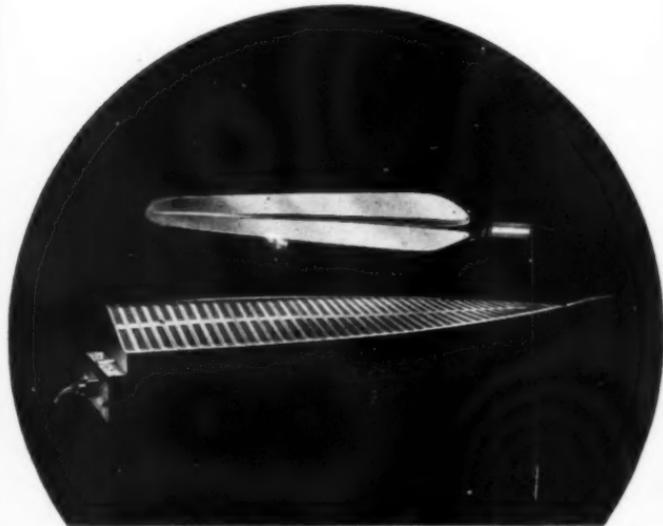
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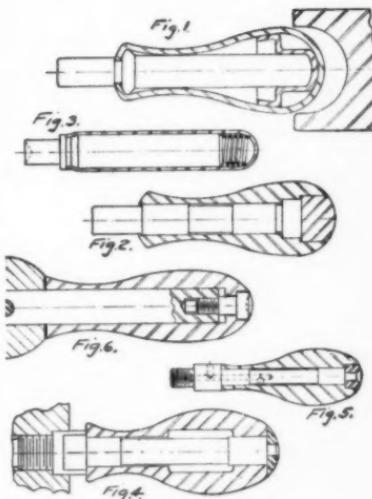
# Rotating Handles and Knobs

By H. F. WILLIAMS

AS an observing youngster during trolley car days, most of us at some time stood next to the motorman and watched him, with gloved hand, turn the wooden handled lever that operated the "make it go faster" box. That wooden handle, free turning on the lever atop the large waist-high rheostat, while not a forerunner of the rotating knob or handle, was a close prototype of the modern method for ease of manipulation. Quick-action handles and knobs, as several manufacturers have christened them, are indeed a boon to the mechanical industry. On a trip thru most shops, you can hardly find a machine that does not have one or several.

All types of lathes, milling machines, grinders, jig borers, planers, shapers, drills, metal cutting saws, rotary tables, gear machinery and some of the larger jigs and fixtures are operated by this type of handle. They are used on hand-wheels for turning screws, gears, and pinions. You see them on cranks and spiders. If you are an old timer you will remember the kitchen coffee grinder with its free turning porcelain knob. Your wife's egg beater and your pencil sharpener have wooden handles that turn on their spindles. Your favorite fishing reel has a plastic handle that helps land that fish you are playing, and the bit brace in your work shop wouldn't function as easily as it does were it not for the fact that the knob rotates on its axis. Such knobs help to raise and lower the windows in your automobiles.

In the group of accompanying figures, it is felt that a general cross section of handle and knob design has been given. Possibly some of the readers can advance other ideas. These handles are



made of steel, cast iron, wood, plastic, and hard and soft rubber. The gripping surfaces range from highly polished smoothness, to heavy corrugations, with knurling annular grooves and finger grips in between. Spindles upon which these knobs and handles rotate are usually designed especially for the particular application but in some instances purchasable hollow or socket head stripper bolts and screw studs are used. Handle retention is by means of screw or rivet head, snap spring ring and washer, peening, spinning and friction alone. Lubrication in some is a life time supply "built-in"; others have means provided for replenishment, while still others rely on a squirt from the oil can now and then.

In the first three sketches are shown designs of manufactured handles, avail-

able from concerns that specialize in making these handles. Thereafter all the other sketches represent designs made to suit the particular requirements and also the ingenuity of the designer. Handles and knobs are treated separately.

In Fig. 1 is illustrated a "quick-action" handle, manufactured by the Rockwood Sprinkler Co. of Worcester, Mass. It consists of a spindle and supporting end guide which are encased in the shell forming the hand grips. The guide, riding on the end of the spindle supports the large diameter of the casing. Before the final swaging operation, that is of crimping the shell over the flange on the spindle, Alemite grease is forced, under pressure, into the cavity of the handle, thereby lubricating the handle throughout its life. Besides being a free-turning handle, the added feature of this design is that there is no exposed joint in the outer casing in which to pinch the fingers. Being made hollow,

maximum lightness is thereby obtained. These handles are made in hardened steel dies and are held to close tolerances. The outer surface of the handle is given a high polish. Because the shank has a drive fit into the handwheel, it must be pressed into place at assembly. An assembling die or set is available as shown at the extreme right of the sketch. With the use of this set, the free running feature is not impaired thru distortion of the shell. These handles are made in four sizes, the shanks being  $5/16$ ,  $3/8$ ,  $7/16$ , and  $1/2$  in diameter by  $5/8$ ,  $3/4$ ,  $3/4$  and  $1$  in long respectively. Overall lengths measure  $2-15/16$ ,  $3\frac{1}{8}$ ,  $3-13/16$ , and  $4\frac{1}{8}$  respectively.

The "Quick Action" handle and the "Revolving Grip" in Figs. 2 and 3 are manufactured by the Cincinnati Ball Crank Co., Oakley, Cincinnati, Ohio. The handle in Fig. 2 is made in three pieces, namely the shaft, handle and plug. The shaft is made with a retaining head which fits into the counter-

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bored end at the large end of the handle. The top of the shaft head protrudes past the top of the counterbored hole from .005 to .010" thereby providing end play of that amount. This clearance also permits pressing the shank into the crank or handwheel without danger of binding the handle after assembly. The shaft is relieved in the center of its bearing surface for an adequate supply of heavy graphite lubricant, thereby assuring permanent lubrication without need of replenishment. The shaft is ground to close tolerances after being hardened. The bearing surfaces being long are long wearing. Because the shaft does not extend thru the top of the hand grip, there is no opportunity for the operator to pinch his fingers. The end plug presses into the grip, bearing at the top surface of the shaft. It seals the bearing against the entrance of grit and other foreign substance and facilitates pressing in the shank when being assembled. The grip is highly polished but is available chrome plated also, the plating being done before the handle is assembled to eliminate the danger of corrosion from the plating solution were it not entirely washed off. Four sizes are available in shank sizes of 5/16" diameter by 9/16" long; 3/8" by 3/4"; 7/16" by 3/4" and 1/2" by 1" Large diameters of the hand grips are 7/8, 1 1/8, 1-3/16 and 1 1/8" respectively. Overall lengths range 2 5/8, 3-25/32, 4-1/32 and 5 1/8" respectively. The shanks are made with a .001 to .003 press fit.

In Fig. 3, the "revolving grip" handle is comprised of either two or three pieces in that the use of the spring is optional. The solid steel shank is notched out at one end to form a shallow shoulder. The rotating sleeve is a seamless, deep drawn, steel stamping. This sleeve envelopes the shank and is swaged over or rolled into the notch in the spindle were thrust is taken in both directions, against the shallow straight shoulder and in the other di-



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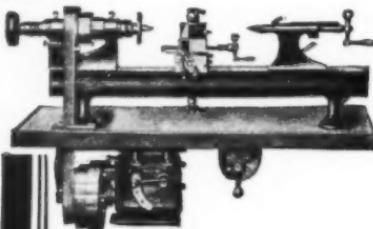
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rection against the angular cut. At this joint enough freedom exists to have a running fit between the two pieces. The end of the spindle is countersunk to facilitate riveting if that method of fastening is desired. An anti-rattle feature is provided optionally in the use of several coils of a compression spring. This spring not only eliminates any possible end play, but looseness radially as well. The handle is  $\frac{7}{8}$ " diameter, the shank being 9/16 diameter by  $\frac{3}{4}$ " long. It has an overall length of  $5\frac{1}{8}$ " approximately.

The shanks of some handles are threaded and screw into the handwheel or lever, being held together by friction alone. A flat is usually provided just above the thread on the spindle. This usually adds to the handle overhang. In Fig. 4, such a handle is shown. The overhang in this instance is somewhat reduced by counterboring the handwheel into which the spindle fits. The flat is fitted by an open end wrench of the so-called thin type, and need be only sufficiently wide to accommodate such a wrench. End of the spindle is turned down to a small diameter on which a rounded washer is fitted and riveted on. The spindle is relieved so that two short lands rather than one long one act as bearing surfaces. To be provided with a sufficient quantity of grease for permanent lubrication, the body of the handle grip is hollowed out. The clearance also reduces the possibility of finger pinching. In some instances the sharp edge is broken with a file.

Another method of assembling is incorporated in the handle illustrated in Fig. 5 in which the end of the shank is also threaded into the handwheel. The shank is drilled out as shown for oil can lubrication. After the spindle is screwed in as far as possible by hand, a pin is inserted into the vertical oil hole and used as a wrench to screw the spindle tight. The end of the shank is

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plugged especially where there is a tendency to assemble into a thru-drilled hole in the handwheel. If the hole is blind the plug may be eliminated. The revolving grip is held on by riveting as in the previous design but there is less possibility of finger pinching here because a plug is used in place of a washer. The depth of counterbore for the end plug must be controlled to provide the necessary end clearance. Both the handles in Figs. 4 and 5 are highly polished and in some cases chromium plated.

A rotating handle with a one-diameter spindle is shown in Fig. 6 and is used for the larger type of handwheel or heavier type of lever or crank. It is pinned for retention when assembling. The outer end of the shank is drilled and tapped for the shoulder screw that holds the handle on. The head of this retaining screw is rounded so as to blend into the contour of the handle. A circular shaped screw slot is milled in,

this type being selected to preserve the rounded effect as much as possible. End play is provided during the assembling operation. Finger or hand pinching is practically eliminated in this design. Lubrication is provided by any one of three methods:—First, by a few shots from an oil can to the joint between the revolving grip and the handwheel; Second, by removal of the shoulder screw; Third, to have a small hole with countersunk edge in the center lengthwise of the grip for the use of an oil can spout.

A simplified type of free-turning handle, involving a three diameter spindle is shown in Fig. 7. The end of the shank presses into the hand-wheel. The head of the shank forms the end contour of the handle. Depth of counterbore in the handle and distance between shoulders of the pin must be maintained for the proper amount of end clearance. Lubrication is effected by methods explained on one and three

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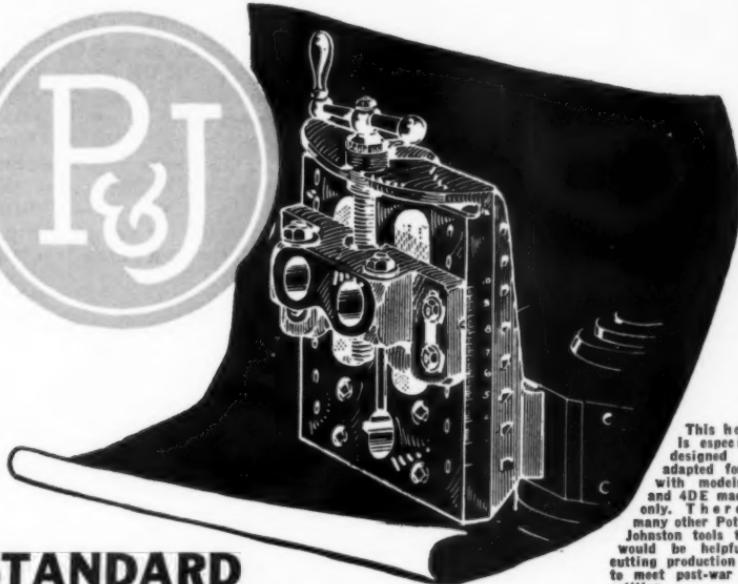
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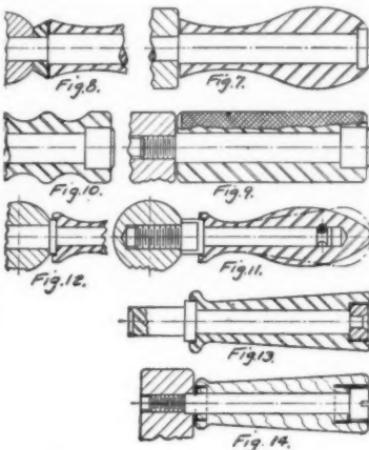
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in the previous example. The hole in the handwheel into which the spindle shank presses must be provided with means of removal of the handle if repairs are necessary. In Fig. 8, the design handle assembly is used but with different treatment of the joint. Whereas in Fig. 7, the handle was assembled into a handwheel having a flat side face, larger in width than the end diameter of the handle, the design in Fig. 8 is for assembly with a handwheel hav-



ing a rounded section. To eliminate the appearance of too great an overhang diametrically, a beveled or tapered washer is used, the small end being placed against the handwheel. By introducing this third piece, a more pleasing effect is obtained as regards appearance. When both the handles in Figs. 7 and 8 are used in a vertical position, lubrication is more readily accomplished. A small countersunk hole is drilled into the shank in the center of the end and connects with a small cross hole about  $\frac{1}{4}$ " below the head of the spindle from where the oil runs downwards.

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Take a ground shaft (finish ground if you like) and scratch a match on it. The match will light. Why? Because there is enough surface roughness to abrade the sulphur tip—to cause friction and heat. These same ridges can penetrate an oil film and cause friction on bearing surfaces. Surface roughness is 20 micro-inches, R.M.S.



Make the same test on a Superfinished surface. The match won't ignite. There is nothing to create friction. Here is a degree of smoothness that will support and maintain a uniformly thin oil film—without ridges to penetrate and abrade the mating surface. The life of such a bearing surface is unlimited. Surface Superfinished to 3 micro-inches, R.M.S.

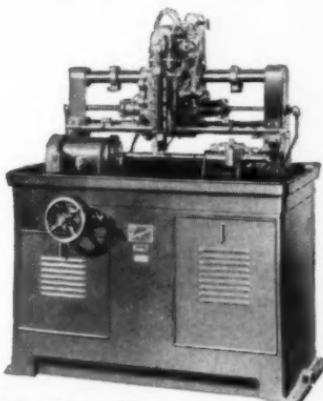
Removing grinder scratches, feed spirals, chatter marks, and partially loosened metal splinters by Superfinishing is a very quick and inexpensive operation. These finely finished surfaces are a real economy because they not only reduce friction and wear to a new minimum, but they also eliminate the most common bearing troubles. And surprisingly enough, Superfinishing may actually cut your manufacturing costs as well—by eliminating other more expensive processes involved in producing smooth finish.

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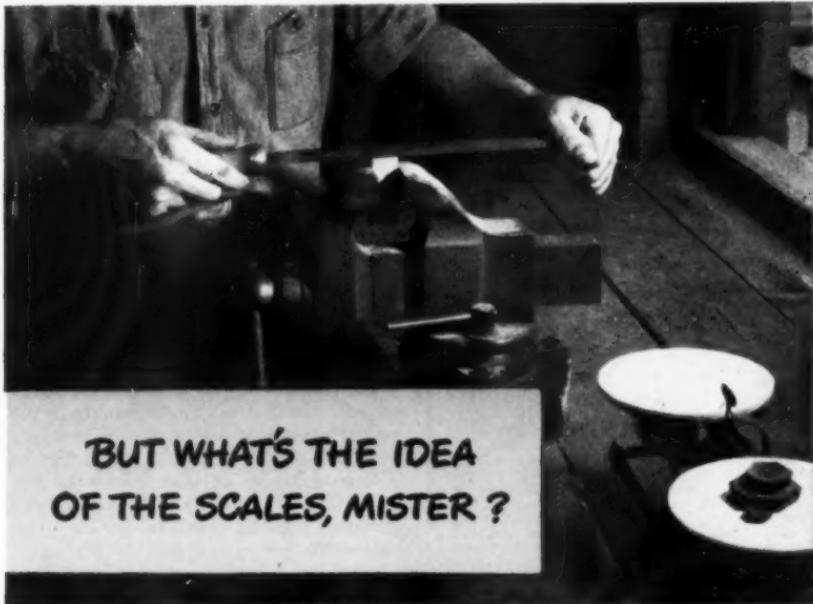
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In all the designs previously illustrated in this article, the surfaces of the rotating handles have been highly polished and sometimes plated. Because of the frictionless rotation that such designs provide, heavy leads are readily managed without undue effort on the part of the operator or with less chance of losing one's grip on the polished handle. Such surfaces are easy on the hands whether they are dry, or oil or coolant soaked. They are especially pleasing to the touch of women operators whose hands usually are not so toughened and calloused as a man's. However, there are some occasions where the designers feel that a more positive grip should be presented to the hand. Sometimes the handle is barely within reach so that only the fingers can be brought into play. Therefore a roughened surface is provided thru the use of knurling, corrugating, grooving or fluting.

A knurled handle, the product of a screw machine is illustrated in Fig. 9. It requires merely a reamed hole and counterbore and has the outer ends chamfered off either 30 or 45 degrees. Mild steel such as screw stock of SAE 1115 or 1020 can be used and knurled without previous turning or truing. The spindle in this design is a heat treated stripper bolt having a socket head for hex. wrench. This type of bolt is available from the manufacturers of hollow and socket head screws. Previously they were obtainable only with turned bodies, but now can be bought with ground bearing surface. Because a range of distances between shoulders is available, handle design becomes relatively easy as far as lengths are concerned. Some designers prefer to sink the end of the body into a counterbored hole for greater strength. Here the relief at the end of the screw threads does not have to take the load, but this load comes on the body of the screw instead when inserted into a counterbored



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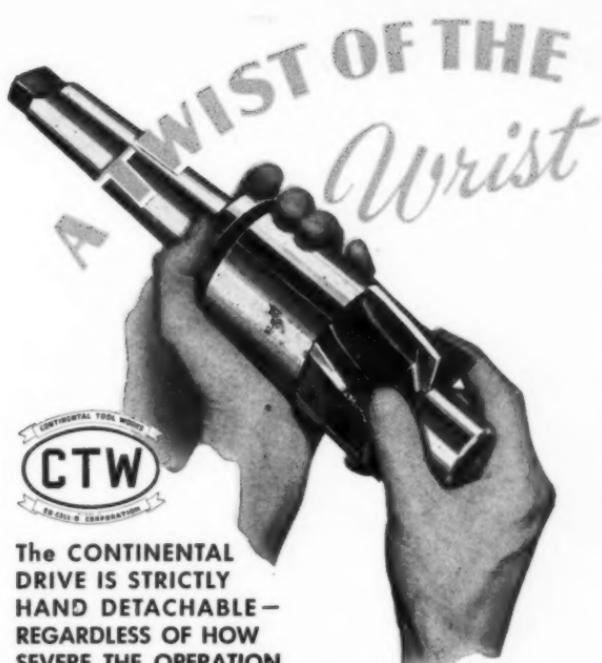
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hole. The choice of knurl is optional, the finer the knurl, the easier on the hands. However whether a fine, medium or coarse knurl is used, the protruding points can be dressed off with a file or the knurling tool does not have to be sunk into the steel its full depth. In either case a flat-topped knurl results.

The rounded annular surface of the ridges is polished on the handle in Fig. 10, to provide a smooth grip, yet the hand cannot slip endwise because of the ridges. The pitch or center distance between peaks is averaged by the distance from finger to finger on a shop man's hand. The peaks should be sufficiently rounded to fit comfortably in the palm of the hand as the fingers are only one-half of the grip. Fig. 10 is but an alternate design of that shown in Fig. 9, in that the spindle is a socket head stripper bolt as used in punch press die work.

Before the outbreak of hostilities in World War II, the Germans had standardized designs and dimensions of all machine handles, including the quick-action type, for use in that country and on machines for foreign use. These arrangements are shown in Figs. 11 to 14 inclusive, there being 5 in number. In Fig. 11, the spindle does not protrude thru the end of the revolving grip. It has a rounded annular groove turned in at one end, this groove accommodating a straight pin. The hole for this pin is crossdrilled offcenter in the hand grip and at assembly is peened over into the countersunk ends of the hole. The ends of the pin are then polished off flush with the surface of the handle. It is significant that this pin had to be drilled out in case repairs were necessary. The groove was sufficiently large to provide clearance both diametrically and longitudinally. The end of the hole in the handle beyond the end of the spindle acted as a pocket for grease. The other end of the grip was flanged



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DRIVE IS STRICTLY  
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**PUNCH PRESSES**

and counterbored to fit over the shouldered end of the spindle. Two shapes of the grip were available, that shown in section and the other as indicated by the dot and dash line. The spindle was threaded with Whitworth or metric threads and flats were provided to facilitate assembly.

In Fig. 12, an optional design is shown. Instead of a thread, the spindle end was finished plain with a press fit into the handwheel. This plain type however was exactly the same from the counterbored flange back as shown in Fig. 11. Because a wrench was not necessary to assemble the handle, the overhang was somewhat reduced as can be seen by the difference in length of the shoulders. Six sizes were available in either the threaded or plain ends ranging from  $\frac{1}{4}$ " dia. thread and  $\frac{5}{8}$ " dia. thread and  $1\frac{1}{8}$ " at the large end of the handle by  $4\frac{1}{8}$ " long. These lengths are of the handle or grip proper and do not include the extension beyond the spindle.

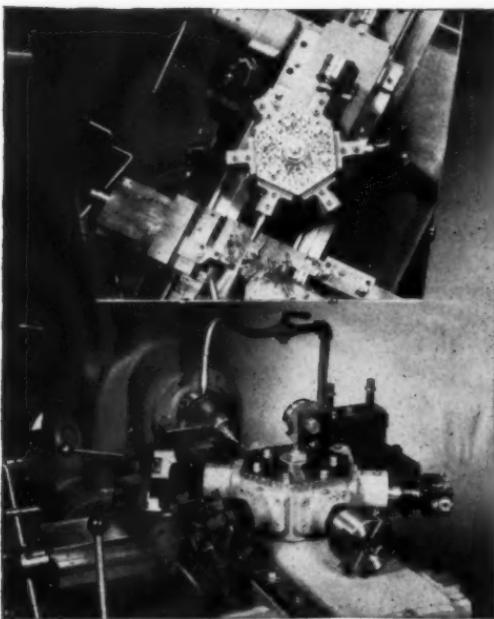
The handle in Fig. 13 is retained on the spindle by a countersunk washer of considerable thickness, nested in the counterbored hole in the end of the handle. This design does not provide facilities for repair. However, during the assembling operation, there is no strain placed on the grip.

This is likewise so in the design shown in Fig. 12 except that in that design the assembling pressure is taken between the spindle flange and recessed portion of the handle rather than on the retaining pin.

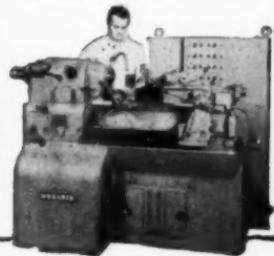
In Fig. 13, the end of the spindle is recessed for peening over if that method of assembly is used. Lubrication of this handle is apparently accomplished by using an oil can to squirt oil in at the washer end.

In Fig. 14 a wooden handle is shown and was presumably used for purposes other than in the design of machine

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Part—Stop Screw, Knurled Head  
Material—1315 Steel,  $\frac{3}{4}$ " Diameter  
Preselected Spindle Speeds—6  
Time per Piece—1.38 Minutes  
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Jobs like these are the reasons why users everywhere call the Speedi-Matic "the world's fastest hand screw machine". For toolroom accuracy at production line speed—on lots of 25 to 500 or higher—you can't beat the Speedi-Matic. Get the full facts now, while deliveries are still favorable.

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Model No. 70

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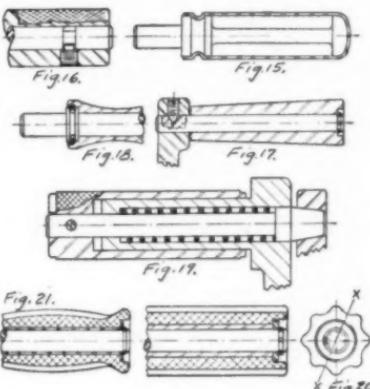


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tools. A metal cupped flange was pressed into each end of the grip for reinforcing purposes and to reduce wear and eventual end play. The large end is counterbored deeply enough for the head of the shouldered screw. The screw body is sunk into the handwheel for additional strength.



A light-weight handle is illustrated in Fig. 15. The spindle, made of mild steel, is of the design to press into the handwheel or lever. The other end is rounded over to approximately fit the contour at the bottom of the outer shell. At the retaining end the spindle is grooved smoothly to accommodate the rolled or spun metal of the shell. Before this operation, the straight shell is partially filled with grease. The spindle is then inserted and set up in a lathe. Pressure is applied to the rounded end, sufficient to remove all end play. A roller tool is then pressed against the shell opposite the groove in the spindle. The metal is rolled into the groove but not tightly enough to bind. A little radial clearance automatically gives the proper end shake, enough to provide rotating freedom. Pressure exerted against the end of the handle during the assembling operation is not absorbed

# Here's Why

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SUPER-SPEED  
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MANUFACTURER'S TEST PROVED THAT THE  
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Four operations were required to machine the tool hole in the boring bar shown above. They included counter-boring, drilling, reaming and milling. To determine what mill would maintain the specified accuracies and complete the job in the least amount of time, test runs were made on a number of units.

Of the mills included in the test, a Gorton 8½-D Vertical Mill was selected as the machine to perform the operation because it proved the most highly efficient from every point-of-view...accuracy, speed, finish, ease of operation.

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#### JOB FACTS

NAME OF PART—Boring Bar with Micrometer Adjustment.

MATERIAL—Alloy Steel.

MACHINE—Gorton Vertical Milling Machine  
Model 8½-D.

FEED—Hand.

#### OPERATIONS—

1. Counterbore— $11/16$ " dia.; 900 r.p.m.
2. Drill— $33/64$ "; 1350 r.p.m.
3. Ream Drilled Hole—.369" and .375"  $\pm .0005$ "; .0000"; 1350 r.p.m.

TIME—15 minutes, floor-to-floor time.

REMARKS—Completed on a production basis with high accuracy and finish.

by the retaining groove as the head of the spindle and the inside bottom of the shell are metal to metal.

It is sometimes desirable that retention of the handle be so designed that the handle can be slipped off its spindle for various reasons. In Fig. 16 the knurled handle is retained on the spindle by use of a hollow head, dog-pointed set screw, the point of which engages a clearance groove in the spindle. It will be observed that the screw should have a comparatively tight fit to prevent loosening or falling out thru vibration. The spindle can be pressed into its mating piece either assembled with the handle or in a disassembled state.

Two other designs of handles that can be taken apart readily are shown in Figs. 17 and 18. In both instances the handles are retained on their spindles by wire snap rings. In Fig 17 the spindle is grooved near the end into

which the retainer ring snaps when it is assembled. The spindle is held in the handwheel or lever by a cone pointed set screw. It will be noticed that the spindle is of one diameter, screw stock being satisfactory. While it is not necessary to counterbore the end of the handle, the design shown provides a neat and flush appearance.

The snap ring in Fig. 18 works opposite from that in Fig. 17. In the latter, the ring contracts on the spindle; in the former it expands in the handle. The spindle shoulder is grooved sufficiently deep to compress the ring below the outer periphery. The handle can then be slipped over the ring which expands when the two grooves register. The groove in the handle should be a trifle shallower than half the diameter of the wire so that a sharp blow at the end will cam the ring inwards thereby facilitating disassembly. The other end of the spindle while not shown terminates in a blind hole in the handle.

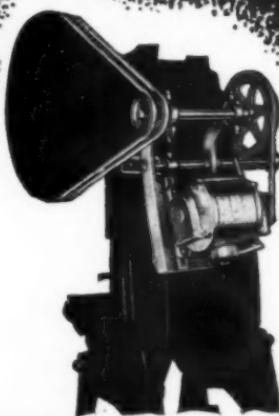
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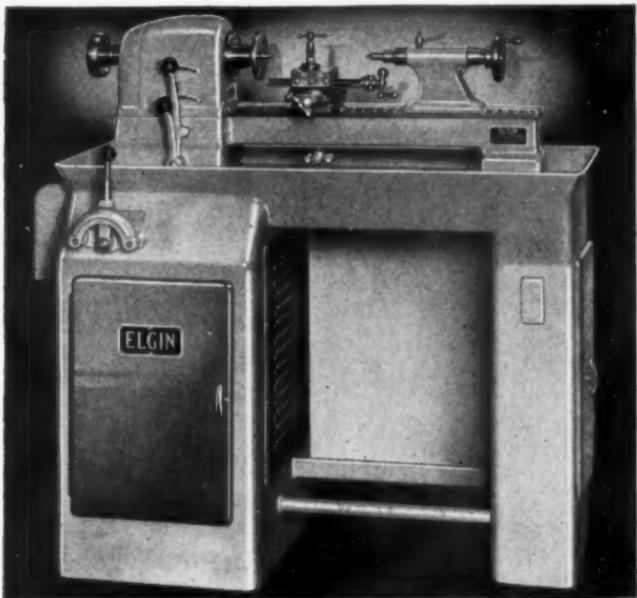
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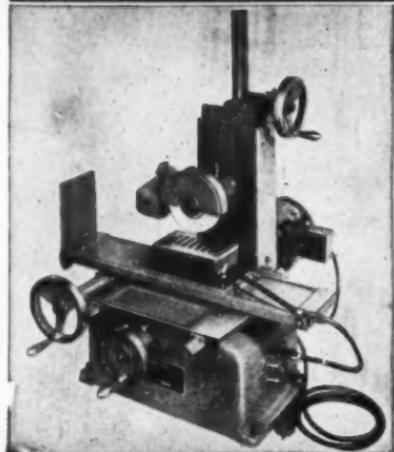
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- Motor is mounted in base with direct cross ventilation.
- Three shelves are provided on right hand side.
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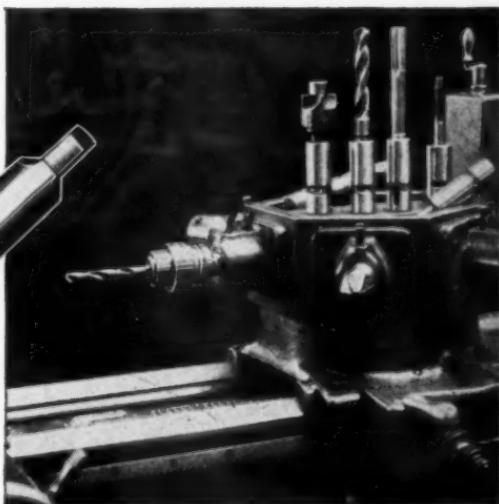
In Fig. 19, a design of rotating handle is illustrated that really has a special purpose. It controls a locating plunger or lock bolt and is used extensively for indexing, gear shifting and locating and positioning in jig and fixture work and in general machine design alike. Mounted either on a lever or handwheel it is equally useful. In the arrangement shown it is mounted on a lever. The long hub on which the handle slides and rotates in this instance is hollow-milled to size. In other designs this may be a piece of soft steel either threaded, pinned or peened over in the lever. The taper ended plunger, backed by a compression spring, is pinned into the knurled handle. Altho a rotating handle is not entirely necessary the movement is small angularly, nevertheless when a complete revolution or more is required rotative freedom enhances its operation. This, of course, means that the end of the plunger is shaped conically so that it engages in any angular position.

When women operators are employed, a handle other than dead smooth or coarse knurled must sometimes be provided especially where it is manipulated all day. Because a woman's hands are more tender, a coarse knurled handle is too rough. However, a rough handle with smooth lands or corrugations, made of rubber or rubber substitute seems to be ideal in such instances. Two designs are illustrated in Figs. 20 and 21. In Fig. 20, the corrugated sleeve is stretched over a long thin-walled steel bushing. The shape of the fluting is shown in the end view while the partial longitudinal view is a section taken on line X-X. The handle is retained upon its spindle in a manner as described under Fig. 17, namely with a wire snap ring which in this case is adjacent to a steel washer. Any end-thrust is absorbed between the metal parts and does not come against the rubber sleeve.

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Modern-Magic Quick Change Chuck and Collet Equipment has repeatedly proved its value to turret lathe operation where there are not enough openings in the turret to accommodate all the necessary tools for the job.

In effect, Modern-Magic Quick Change Chuck and Collet Equipment makes available as many extra turret stations as are needed. The tools being inserted and removed, one after the other, to take care of each extra operation.

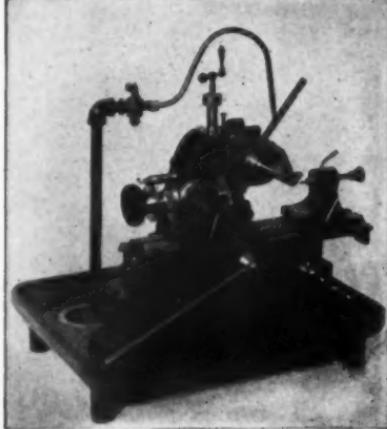
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Whereas the grip in Fig. 20 is straight, if there is a possibility of hand slippage endwise, the design in Fig. 21, is more ideally suited. Here the cross section axially is elliptical in shape with a tapering and enlarged guard at the right hand end. The left hand end may be treated likewise but the handwheel or lever might act as a guard at that end. The end view with the same style of fluting is similar to that as explained under Fig. 20. In both designs the rubber sleeves are molded of comparatively soft and resilient rubber, natural or synthetic. It has been found that such a coarsely corrugated handle does not have to be gripped as tightly as another form of surface as the soft parts of the fingers and hand readily fit into the grooved contours of the grip.



Fig. 22.

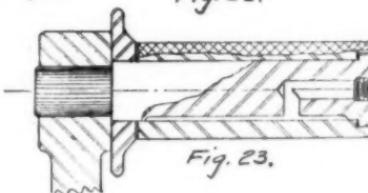


Fig. 23.

When color is introduced into the handle picture, the use of plastics seems to be the answer. In Fig. 22, a molded plastic grip and mounting are shown. The grip itself has a series of annular half-round grooves and is elliptical in shape lengthwise. The spindle is headed in such a manner as to form a continuation of the elliptically shaped grip to a radiused end. The other end is shouldered and straight knurled. It is pressed into the lever and headed over to a snug fit. The drilled hole facilitates heading over. End play is kept at a bare minimum so that finger pinching is



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## ★ FEATURES ★

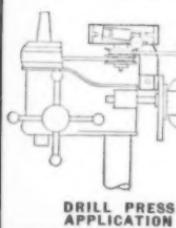
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### SPEED TABLE

Reduction Ratio*	Mach. Speed Min.	Speed Max.
1-1	1000	3240
1-1.5	666	2160
1-2	500	1620
1-2.5	400	1300
1-3	333	1080
1-3.5	229	928
1-4	250	810

\*Reduction ratio between motor pulley and driven pulley. Figures above based on 1800 RPM Motor Speed.



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impossible between the end of the grip and the rounded head of the spindle. The handle grip is polished to a brilliant luster and makes an attractive presentation. The grip need not be bushed but the hole is finished to a smooth surface.

The last handle in this group as shown in Fig. 23, is for heavy types of installations. The grip is very coarse-knurled and has a loose or separate collar to act as a guard. Of course, this design may be altered by making the grip and guard in one piece if consideration is given to the knurling operation. In this arrangement, the end of the spindle is also straight knurled for a good press fit into the hole in the lever arm. The spindle is headed with a low retaining shoulder. It is drilled, tapered and grooved by lubrication. If used in a vertical position, the guard would seem to be more effective.

In a forthcoming issue of the BLUE BOOK, the subject of free-turning knobs will be treated in a similar manner. A number of various designs will be illustrated.

## Self-Propelled Single-Unit Compressor

Production of a unique mobile construction unit, which combines a tractor with an air compressor, has been started by the Le Roi Co. and shipments were to begin about July 1, C. W. Pendock, president of the company, said recently.

The company, which manufacturers industrial engines, air compressors, mowing machines and other items for the construction industry and allied fields, also is developing a complete line of pneumatic tools to be produced in a plant in Cleveland which is being acquired from the War Assets Corp.

A third expansion move which the company will undertake will be the enlargement of the plant at West Allis. In the next year Le Roi intends to spend more than \$1,000,000 on expansion of plant and equipment.



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SF: Steel Finishing carbide for finishing all types of steel.

CR: Coarse Roughing carbide for roughing cuts on all materials.

JESSOP also makes carbide dies, die inserts, and wear resisting parts. A new building, recently completed, has been equipped with the most modern facilities for carbide production. Write in full concerning your requirements. Tool catalog sent upon request.

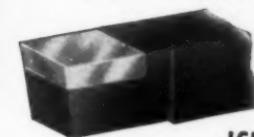
*Styles of Tools*



JC1  
LEFT HAND JC2



JC3  
LEFT HAND JC4



JC5



JC6



JC7  
LEFT HAND JC8



JC9-  
LEFT HAND JC10

**JESSOP STEEL COMPANY**  
WASHINGTON, PENNSYLVANIA

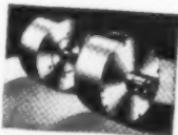
Many people have asked us, and perhaps all operators wonder — "Will Skinner Power Chucks hold if the air supply fails?" To prove the outstanding design and safety features of wedge-type construction, the following tests were made with Skinner Power Chucks.

**PROOF** — A 10" heat-treated steel forging was gripped on the O.D. in a Skinner #1315-A8 air chuck on a single spindle automatic lathe. The chuck was operated by a Skinner #2112 cylinder. The air line pressure was 85 pounds. After gripping the work, the entire air intake of the cylinder was removed and the machine was left idle for one hour. The machine was then started and, without any further air pressure being applied, simultaneous 1/4" boring and 1/4" facing cuts were taken. The piece did not slip.

**PROOF** — The test was repeated under the same procedure except the forging was held on the inside diameter. A 5.16" cut was taken on the outside diameter and simultaneously a 7/32" cut was taken on the face. Again there was no slippage.

**PROOF** — As a further test, standard soft jaws were put on the chuck and a 2 1/4" bar, 42" long, was inserted. The chuck was closed with 85 pounds pressure on the #2112 cylinder and the air intake was removed. With the spindle turning at 252 R.P.M., a crowbar was put under the turning bar at the end. With this bar, the operator attempted to move or tip the bar and loosen the jaws, without success.

These tests prove that Skinner Power Chucks offer a valuable safety feature not found in all air chucks.



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# Carbide Die Use Increasing Rapidly

By EARLE GLEN\*

THE rapid increase in the use of hard metal carbides for cutting tools has been so spectacular during the past few years that it has tended to eclipse the more gradual but equally important growth in use of carbides for dies. Not only have carbide dies become standard equipment in the drawing of round wire and for drawing tube, bar stock, and shapes, but also many are now being used for the deep drawing of sheet metal.

The latter development is relatively recent, however. Until 1940, the largest carbide die for deep drawing sheet was only about 4" I. D. The largest tube drawing dies and mandrels of that period were 3" and 1½" in diameter respectively. Carbide blanking and laminating dies, and dies for bolt heading and cold nosing were practically unknown in industry in 1940.

The War Program greatly accelerated the use of carbide dies. In fact, their use was a major factor in obtaining and maintaining high production rates on numerous war items such as cartridge cases, both brass and steel.

## Deep Drawing

Today, there are in regular service, carbide dies for deep drawing with I. D.'s as large as 13½". Since a carbide nib of this size weighs more than 100 lbs., special techniques for the production of such large dies have had to be developed. One such is the "hot press" method in which the three major operations of pressing, semi-sintering, and sintering are combined in a single operation, with the final die nib having the same close tolerances and high surface finish as the smaller sheet metal dies.

A wider variety of shapes, and also a greater variety of metals, are now being drawn thru carbide dies than in pre-war days. For example, they are

now being used in the manufacture of kitchen ware and other household utensils (particularly coffee pots, small and large funnels, and pressure cookers). Metals now being drawn on carbides include the plain carbon steels; special alloy steels; stainless steels; brasses; bronzes; copper; aluminum alloys; zinc alloys; lead; and tin.

Experiences of users indicate major reasons are that the carbide dies (1) have an appreciably longer service life

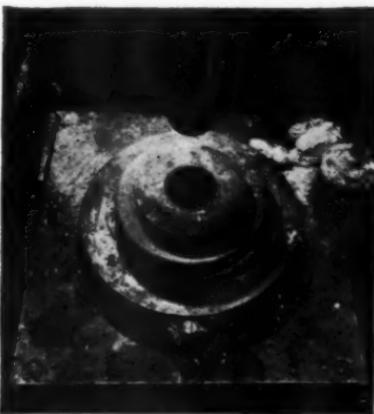


Fig. 1—When changing over from steel to Carboloy dies for the deep drawing of sheet metal, it is generally unnecessary to make changes in press operation, lubrication, or die design.

than comparable steel dies; (2) cut down the amount of servicing required; (3) noticeably step up production; and (4) give a better surface finish to the metal, thereby often reducing subsequent buffing time. In addition, with carbide dies the total number of draw-

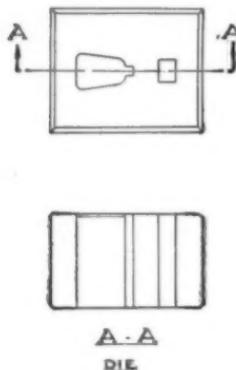
\*Manager of Die Sales, Carboloy Co., Inc., Detroit, Mich.

ing operations is less, thus also reducing the total die inventory of a plant. Decreased down time of equipment for maintenance and servicing is another item mentioned.

A typical example is the experience of an Eastern manufacturer who estimates that of his company's 4,000,000 annual deep drawing operations (in the production of high pressure cylinders for fire extinguishers and storing commercial gases), fully 95% are currently performed with Carboloy dies. The LD.

diameter and 32" long. The metal stock runs from .040" to .440" thick before drawing, and includes tough chromemoly steel (SAE X-4130) as well as other types of alloy steels; plain carbon steels; stainless steels; and numerous aluminum alloys.

Use of carbide dies in this plant has reduced scrap by some 50%; increased the number of OK'd pieces turned out by at least 30%; and improved the completed product by eliminating surface defects from the finished pressings. Die



*All Parts Shown Are Of Solid Carboloy Cemented Carbide*

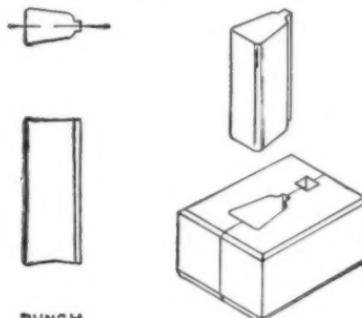


Fig. 2—These Carboloy stator laminating dies are made in two halves, clamped together so they can easily be taken apart for regrinding. The punch tapers towards center, providing freer cutting action and prolonging punch life. This type of carbide die set lasts about 50 times longer than similar steel sets used for identical operation.

of the dies range from 2" to 13½". The completed gas containers range from 2" in diameter by 6½" long to 8¼" in

life has been increased by a ratio of 20 to 1 over what it was when steel dies were standard. Moreover, whereas steel

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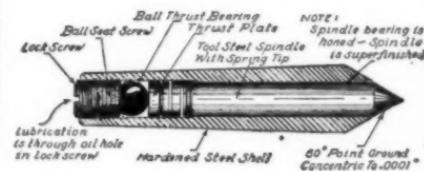
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dies needed repolishing after every 2,500 draws, the carbide dies do not need servicing until after some 10,000 comparable operations.

No changes were necessary in press operation, lubrication practice, or die design when the change-over from steel to Carboloy dies was made (see Fig. 1). Some changes were made in die size, however. As a result of these changes, the total number of drawing operations was reduced by some 15%. For instance, a cylinder previously requiring six draws now needs but five draws inasmuch as the Carboloy dies permit

heavier drafts to be taken without reducing the service life of the dies materially.

### Punching and Blanking

Application of carbide punches and dies to blanking and laminating is steadily increasing. Excellent performance is being obtained on blanking steels and other metals in thicknesses up to .025", in rounds and simple shapes. Development work is being carried on more complicated shapes and thicknesses greater than .025". Averages of 1,500,000 to 2,000,000 punch-

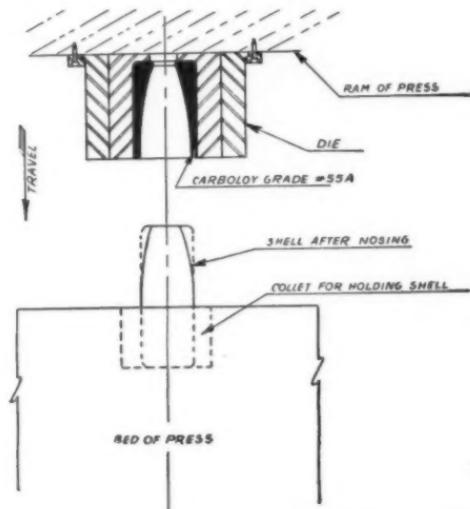


Fig. 3—The Carboloy dies used for cold nosing artillery shells up to 105 mm. in size produced from 1,000,000 to 3,000,000 shells per die, as contrasted with 50,000 shells per steel die. The carbide dies did not tend to wear and gall as the steel dies did. No change in cold nosing practice was required when making the change-over from steel to Carboloy.

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es are being obtained with Carbology dies and punches between re-grinds, as contrasted with a comparable average of some 50,000 operations for steel punches and dies.

Typical lamination die practice is to be found in a West Coast factory where laminations are punched out of sheet metal at single step index machines in the manufacture of stators for electrical motors (Fig. 2). This is an unusually severe application since the sheet steel —altho only .016" to .018" thick—contains 2.50% silicon and 1.2% carbon and in addition is given an annealing treatment which forms a tight scale on the steel. This scale is extremely abrasive.

The Carbology dies used in this operation are made in two halves, clamped together so that the die can easily be dis-assembled for regrinding. The carbide punch tapers towards the center, which tends to give the punch more shear, thus providing freer cutting action and greater punch life. The dies and punches formerly used on this job averaged 46,000 punches before regrinding became necessary. The Carbology punch and die sets have produced as many as 2,304,000 pieces between grinds. Moreover, the carbide sets produce laminations which are entirely free from the objectionable burrs present when steel dies were used. Such burrs make it difficult to stack the finished laminations, and could result in excessive current loss in the completed motor.

### Tube Drawing

Diameter of tubing drawn thru carbide dies has been upped to at least 6" from the pre-war limit of around 3". Carbide mandrels of more than 3" diameter are also in use. In addition to giving a 20% to 30% increase in linear feet of tubing produced on the draw benches, carbide tubing dies also permit holding finished tubes to closer tolerances over longer runs; produce a finish superior to that obtained on steel; and show a service life ratio conservatively estimated at from 20 to 30 to 1 over steel for comparable operations.

Steel rocket tubing is an example of large steel tubes drawn with carbide dies which may now be cited. Entering size of the tubing was 5-9/16" O.D. It

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was cold drawn down to an O.D. of 5.035" and a wall thickness of 7/32", at a materially higher speed than could have been obtained with steel dies. Up to 690,000 linear feet of rocket tubing was produced per die.

Tubing of various non-ferrous alloys is also being drawn in production. A good example is the production of Naval condenser tubing of cupro-nickel and aluminum bronze. Both of these alloys are so tough that conventional steel mandrels and dies wore out quickly. With steel dies, it was impossible to meet war production schedules. Adoption of carbide dies and mandrels increased both the service life of the equipment and the speed at which the tubing could be drawn to a point where schedules were met.

### Cold Forging

War experience proved the practicability of cold nosing steel with carbide dies. By V-J Day, carbide cold nosing dies were so widely used in the shell industry for projectiles up to 105 mm that such dies were rapidly becoming "standard". Use of Carboloy dies for such cold forging work involved no departure in practice, altho in most cases, slightly more care was exercised in lining up dies.

The nose was formed on the shell by a single stroke of the press, the die being attached to the press ram (see Fig. 3). Production ranged from 1,000,000 to 3,000,000 shells per die under continuous operation. This compares with an average of 50,000 shells per tool steel die. Moreover, carbide dies did not show any tendency to gall and wear.

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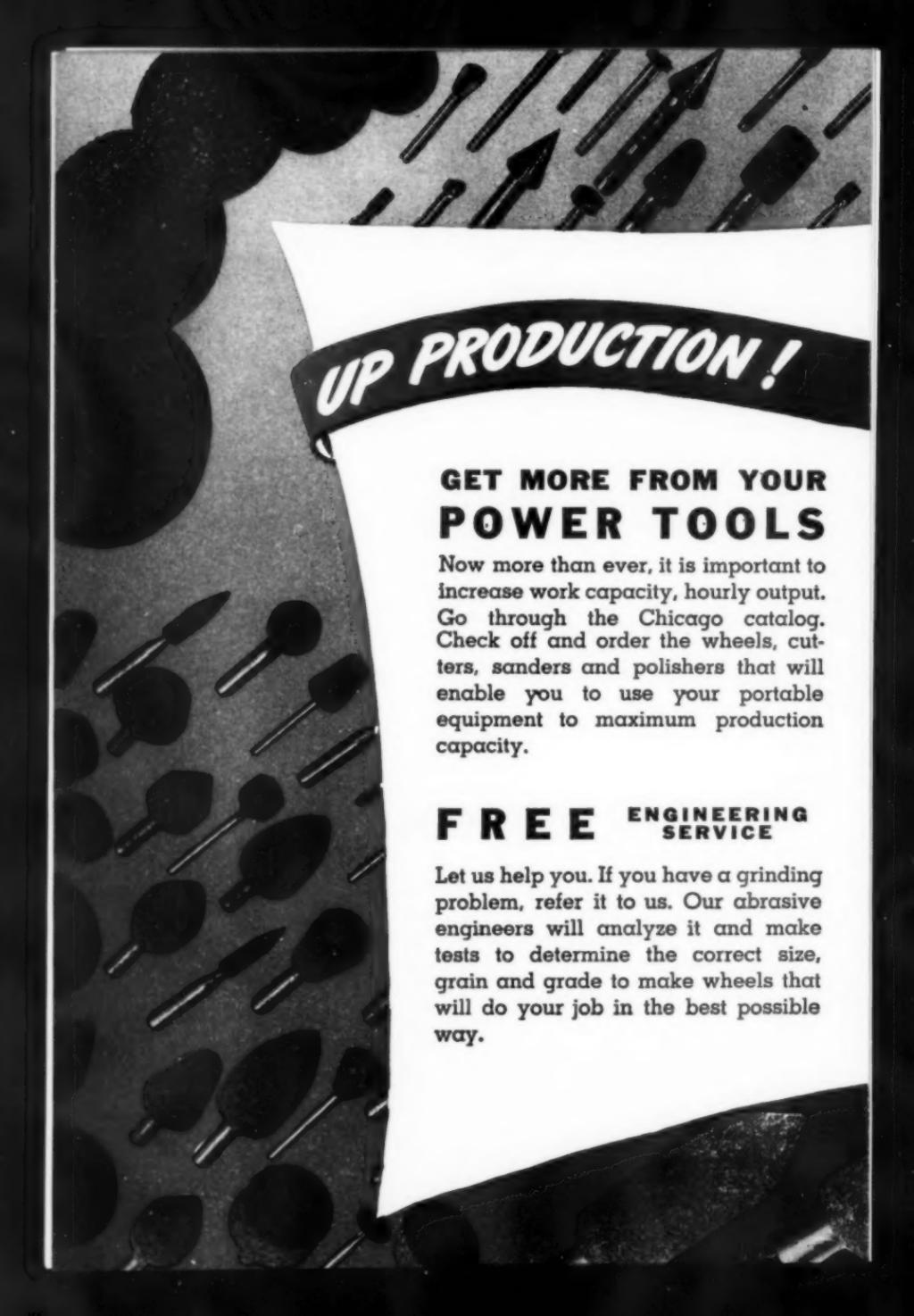
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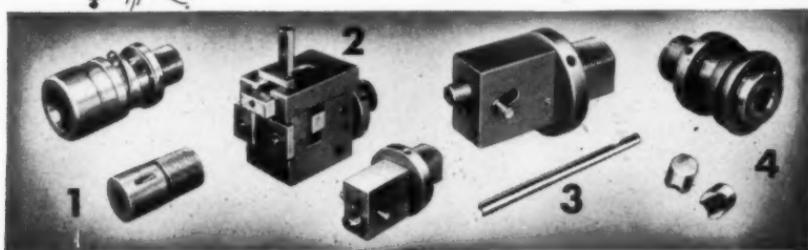
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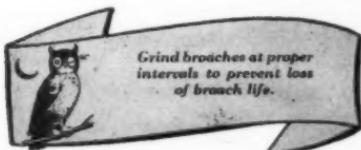
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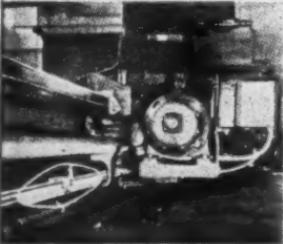
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# MODERN METHODS OF GEAR INSPECTION

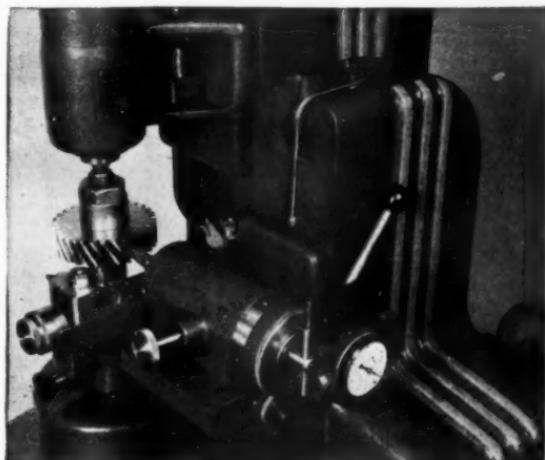
By DON MONCRIEFF\*

TO insure accuracy in gears, it is necessary to inspect and control all factors relating to the finished product, beginning with the material. Either chemical analysis should be made of all steels received, or test pieces should be hardened out of each shipment. Such test pieces are inspected for heat treat

er attention, the gears will be inaccurate regardless of the care exercised in cutting the teeth.

To produce quiet and therefore accurate gears, it is also necessary to control several other elements among the most essential of which are tooth pro-

Fig. 1—Use of the Michigan Sine-Line Model 1124 Involute Checker for checking the involute form.



distortion so allowances can be made for gears run in regular production.

Before teeth can be cut accurately in the gear blank, it is necessary to see that holes are accurate, that they are accurately centered, and that locating surfaces are square with the holes. Gears integral with a shaft should have protected centers and should be inspected to see that the centers are not nicked and are free from foreign matter. Unless these factors are given prop-

file; tooth spacing; helical lead and spur gear tooth alignment; size and concentricity. These inspections should be supplemented by a final inspection consisting of sound testing of the completed gear on a speeder.

## Checking Tooth Profile

Tooth profile may be checked on a Michigan Sine-Line Involute Checker

\*Asst. Chief Engineer, Michigan Tool Co., Detroit, Mich.

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which works on a sine-bar principle, eliminating the use of master forms or multiple master base circle discs (Fig. 1). The gear is mounted between centers and an indicator finger brought into contact with the tooth profile. Movement of the finger and rotation of the gear are synchronized so that

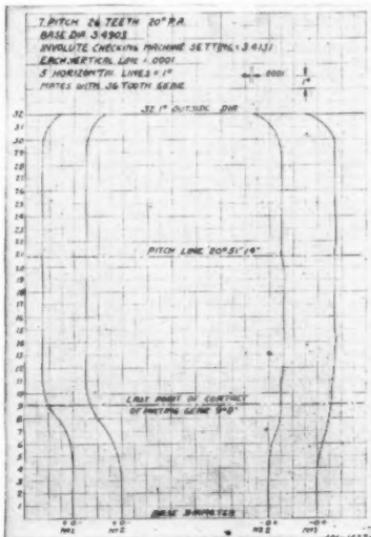


Fig. 2—Chart plotted to show the involute profile of right and left hand surfaces of two gear teeth on a 7-pitch gear.

one degree of rotation of the finger moves  $1/360$ th part of the circumference of the base diameter of the gear being checked. The Involute Checker is operated by hand wheel, each turn of which equals  $2^\circ$  rotation of the gear.

One form of record for retaining readings obtained with the Checker is shown in Fig. 2. The charted lines at the left have a plus sign on the left of the vertical centerline of the graph. The charted lines on the right have the plus and minus symbols reversed. Thus the chart gives the impression of look-

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ing at a cross section of a gear tooth. Horizontal line at bottom of chart represents base circle of the gear being checked. The gear rotates while it is checked, offering a basis for locating the last point of contact of the mating

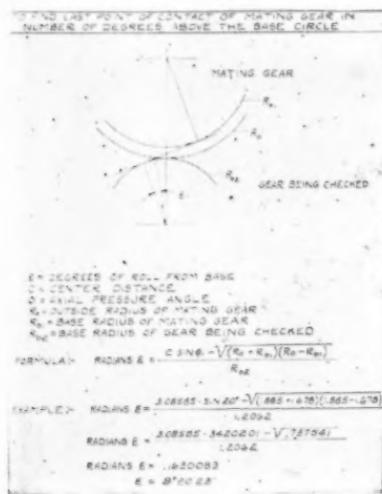


Fig. 3—Formula and method for finding last point of contact of mating gear in number of degrees above the base circle.

gear, the pitch line, and outside diameter of gear being checked. Degrees of rotation are given at left of chart. Horizontal lines indicate last point of contact, pitch line, and the outside diameter. Vertical lines of the graph represent .0001".

Lines are plotted by taking indicator readings every one or two degrees as required. If a perfect involute were charted, the resultant graph line would be straight. On the sample chart, involute of the gear checks within one ten-thousandth from  $11^\circ$  to  $30^\circ$ . From  $30^\circ$  to the O.D. there is a modification of about one-thousandth. There is also a modification of  $.0012$  to  $.0015$   $11^\circ$  to the base circle. The chart therefore in-

dicates that the gear would operate satisfactorily, there being a modification below the active portion of the involute and a modification of a few tenths at the O.D. to ease contact with the mating gears as the gear teeth come into mesh.

Fig. 3 is a formula for finding the last point of contact of the mating gears in number of degree of rotation of the gear on the checker. Formulas for location in degrees of roll of the pitch line and outside diameter are shown in 3a.

Shaper cutters, master gears, and involute splines may also be checked on the Involute Checker.

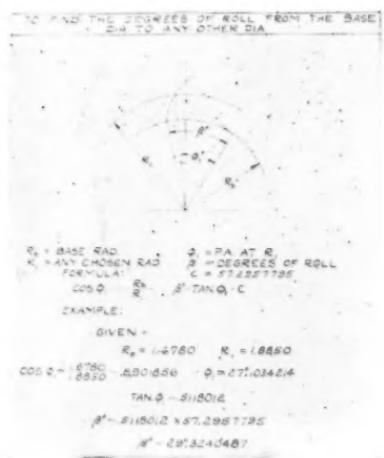


Fig. 3a—Method for finding the degree of roll from the base diameter to any other diameter.

### Hob Contour Checking

A Hob Contour Checker may be used for checking profiles of hobs. This checker, which is limited in use to inspection of hob and worm profiles, works on the sine-bar principle. The hob is mounted on an arbor integral with a sine-bar table which is adjusted



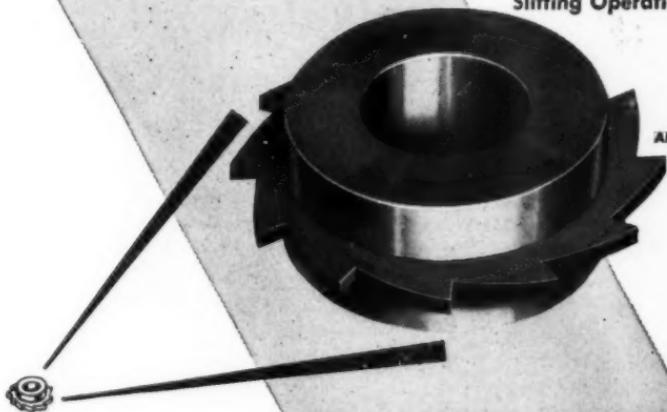
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In Toledo: George E. Sanderson, 663 Spitzer Building. Phone: Main 3939.



Fig. 4—This Michigan Model 1205 Sine-Line Lead Checker will check the leads of gears from zero to infinity.

to the proper angle. A knife-edge contact finger is brought into contact with the hob tooth profile and moved across the tooth surface to indicate irregularities. Use of the checker facilitates inspection hobs for correct pressure angle, assuring the user that all hobs for the same job will be of identical tooth shape.

#### Tooth Spacing

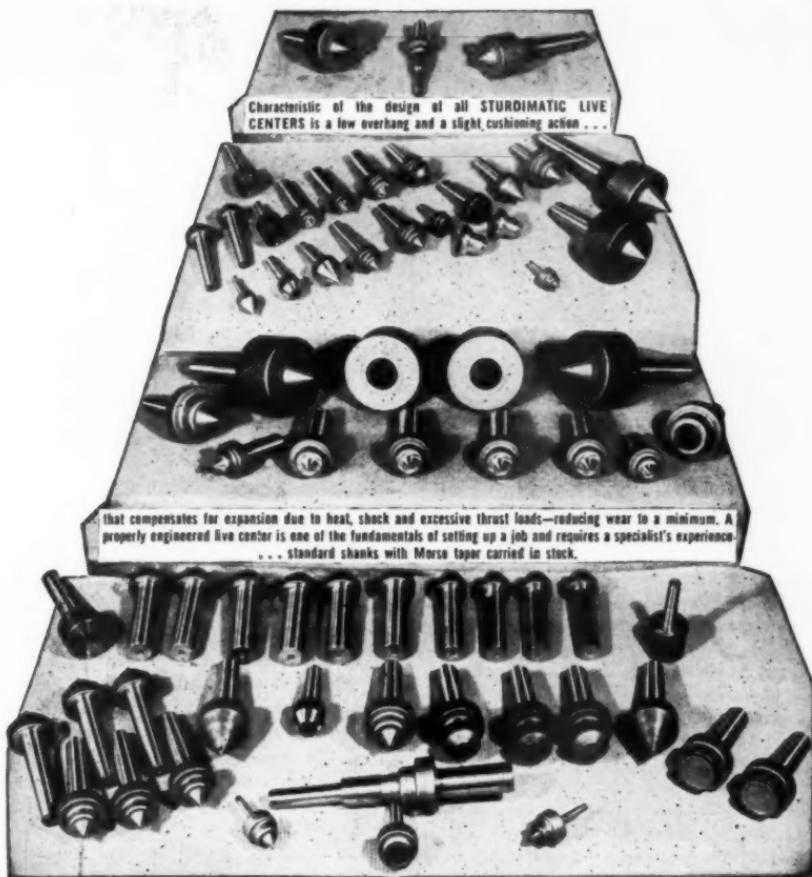
Tooth spacing is best checked along the line of action between two gears. The distance between adjacent involutes along the line of action is the base pitch. Tooth spacing and tooth form can be checked on an Involute Checking Machine. The indicator contact finger is located tangent to the base circle (on line of action). The positive stop is located on the line of action and the distance between the contact finger and positive stop is equal to the base pitch of the gear being checked. In cases where the root diameter is above the base diameter, the contact finger and positive stop are moved tangent to the base circle without disturbing their positions relative to each other.

until they are located in proper contact with the gear teeth.

#### Lead and Alignment

To avoid misalignment of tooth surfaces or a condition of mismated helices, checking parallelism of spur gears or lead of helical gears is an absolute necessity. Fig. 4 shows a machine that will check helix angles on helical, worm, or spur gears from zero to infinity. The gear is placed between centers and an indicating finger brought into contact at any desired depth on the gear tooth. The finger is integral with a ball mounted table which moves parallel to the face of the gear being checked. Movement of the indicator finger and rotation of the gear are synchronized by setting an adjustable sine-bar. Machine is operated by turning a single hand wheel. Errors in alignment are read on a 1/10,000 indicator, or may be recorded with an automatic recorder.

Another machine (Fig. 5) for quickly and accurately checking lead in gears



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Fig. 5.—The lead of both internal and external helical gears is being checked on these two Michigan Model 1200 single purpose lead checkers.

in production is useful in shops employing large numbers of gear shaving machines, to facilitate setting the cross-ed-axis angle on the shaving machine. The machine employs a master lead equipped with 3 or 4 starts equally spaced about its periphery. An indicator is placed in contact with one of the gear tooth surfaces and the gear is guided past the indicator by a master lead. Both gear and master gear are mounted on a single spindle. Without changing the

position of the gear on the spindle, three or four teeth can be checked, depending on the number of starts on the master.

### Hob Lead Checking

Contact between an involute profile and straight sided rack tooth occurs only on a straight line. This straight line is known as the line of action between a hob and the gear being generated. To check both line of action and lead of a hob, a Hob and Worm Lead Checker may be used. In the Michigan "Sine-Line" machine a new method of hob inspection and control

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was introduced, offering a composite test for hobs. A supplementary sine-bar imparts motion to the indicator contact finger at right angles to motion imparted by the first sine-bar. Thus, leads of worms and hobs that fall between zero and 18° may be checked by using the first sine-bar. Line of action checks on the same hobs are obtained thru the simultaneous use of both sine-bars.

While checking the line of action, all

elements of hob accuracy are checked simultaneously. If the hob checks to given tolerances, it may be expected to produce an accurate gear, provided it is mounted in the same position in which it was checked and that errors introduced by the hobbing machine are negligible.

#### Size and Concentricity

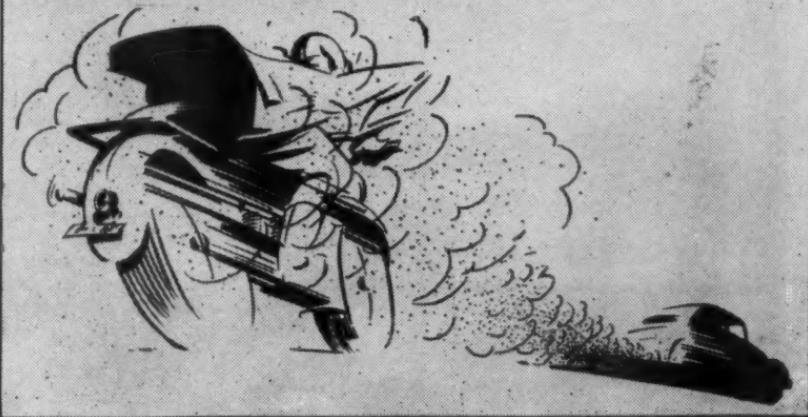
If size of gears varies materially, they will not mate on the proper center distance, or the gears are likely to bind in operation due to heat expansion. Failure due to binding may also result if the gears are extremely eccentric, altho eccentricity is usually objectionable only from the noise standpoint.

A testing machine has been developed at Michigan which is useful for checking gear size over rolls, eccentricity over a pin, and parallelism of spur gear teeth. In addition, all pertinent elements affected when sharpening a hob or milling cutter can be inspected on this machine. The machine resembles bench centers with several attachments which can be mounted on an auxiliary table. The table is capable of being moved accurately parallel to the line of centers and at right angles to the line of centers.

#### Gear Speeder Test

The combined effect of all gear errors will show up in a test run on a speeder designed to duplicate as nearly as possible, actual operating conditions. An

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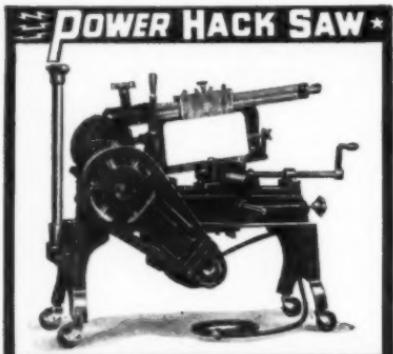
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excellent type of speeder, which was developed to meet virtually every demand for running two mating gears, is equipped with a drive mechanism which may be applied to either spindle while a brake load is applied to the spindle holding the mating gear. However, with each spindle turning in the same direction, the driving and braking action may be reversed to simulate the action of a car transmission under drive and coast conditions. Four spindle speeds are provided ranging from 580 to 1740 rpm. A larger speeder of the same basic design provides a range of speeds from 580 to 1800 rpm and will take gears of a maximum diameter of 13".

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This catalog, designated as No. 46, is available to all industries. A request may be addressed directly to the Acromatic Tool Co.

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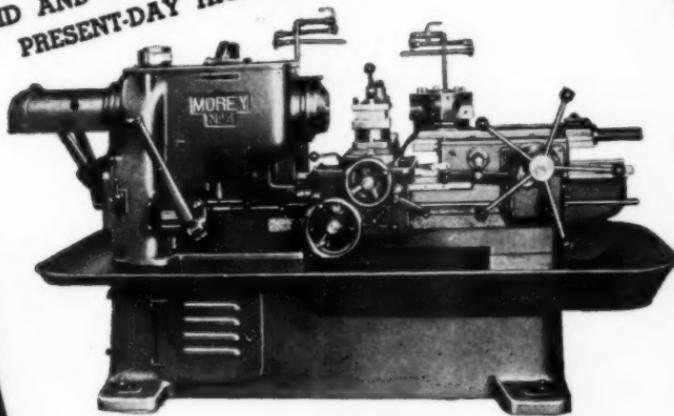
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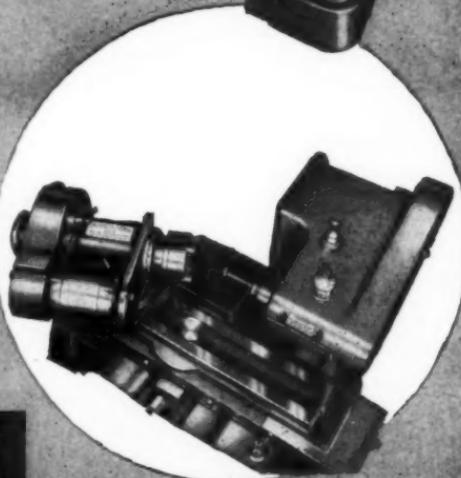
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# THE FOREMANSHIP FORUM

By Edmund Mottershead

## What Do You Know About the Subject?

**T**HREE is more to effective speaking than just a flow of language. The "glib talker" is no more liked or respected by his fellow workers and listeners than the man who has nothing to say. If you as a foreman hope to become more effective as a leader thru developing the ability to speak effectively, you will have to stop and consider what you actually know about your subject.

Perhaps you are thoroly conversant with all of its technical and social aspects and implications. Perhaps a little self-examination will reveal serious gaps in your own knowledge, which will mean that you must get the necessary information before talking to your listeners.

You have, I hope, already studied your prospective listeners and more or less determined which of their basic motives and desires you will appeal to in order to make them want what you have to offer. Your problem in providing factual information is primarily one of selecting that material which will be interesting to them and relevant to the points you are making.

You persuade people by **appealing to** their basic motives. You appeal to their basic motives by **talking about** the things which will be of greatest interest to them. What? There are three

types of things to talk about, things which will hold their interest:

You may use illustrations which are familiar to their life experience. You may use specific or concrete examples. You may use an occasional illustration or phrase which is novel or original. These are the three "elements of interest."

1—The familiar; 2—The concrete; 3—The novel.

### The Familiar

What do we mean by saying that you must use illustrations which are familiar to the life experience of your listeners? More than just talking about the things that they know about and have had some experience with. We must remember as a fundamental principle that each of us requires two things of life:—that life "make sense" or have meaning to us as individuals; and that as individuals we have a meaningful part to play in the whole scheme of things.

Your listeners must be able to understand the things you talk about, and they must also be able to **appreciate** or evaluate them. People will understand what you are talking about more readily if they have had some personal experience or contact with the things or events you are describing. They can



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evaluate and appreciate the importance of what you are saying if it makes sense in terms of their experiences.

One of the best illustrations of this principle that I have ever seen is the enrollment in my own classes in effective speaking and human relations. At first glance, it might seem reasonable that younger business and professional men, younger salesmen and foremen, might be more interested in learning to speak effectively, because that ability would help them increase their earning power, increase their ability to handle people, would in other words hasten their success. Not so! the bulk of the students have consistently been the men past 40 years of age and nearer 50. Why? Simply because these older men have had more life experience, can look back over their own lives and see occasions when they might have been more successful had they been able to speak effectively. They can both understand, intellectually, the application of the principles of effective speaking to their lives and work, and also can appreciate its value emotionally because of their own life experience.

Thus the most effective way to interest your listeners is to talk about the things which are familiar to them. What are some of these things with which they are familiar? Life itself is a subject of unlimited scope. Anything in life will be familiar to somebody. The problem



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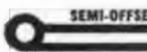
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you have, however, is that of selecting things which will be the greatest common denominator of the experiences of the group you face at the moment. If your listener is a single individual, his own life experience is the key to his interest. That is why I have previously mentioned the fact that you need to know a great deal about your listeners, their age, sex, occupation, education, and backgrounds in general.

Depending upon your listeners, a few of the major common denominators of human experience would be:—bodily functions and health, eating, drinking, sleeping, eliminating, sex and reproduction, disease, breathing and rest; clothing, for utility and taste, materials and styles; housing of all kinds, homes, houses, apartments, offices, factory buildings, public housing projects; vices of all kinds; amusements, ranging from games at home to night clubs, movies, hobbies, radio, the theater; cultural pur-

suits; religion; work and play; politics.

The field is unlimited. Your problem is to pick out the elements of life which will be most familiar to your listeners, and talk about those particular elements which have some bearing on what you have to say.

### The Concrete or Specific

What do we mean by using specific or concrete examples? Just being definite and to the point. It is the difference between saying, "A bunch of us went bowling", and saying, "Bill and Sam and I beat the Hot Shots last Wednesday". It is the difference between telling a worker to be accurate and telling him to work within close tolerances.

When you first began to think about talking on your particular subject, you recalled a personal experience that motivated you to talk. So to begin with, you have a story to tell about your own experience. The first development of all literature came in story form. Homer, the story teller of ancient Greece, Virgil, the poet-narrator of Rome, the Medieval bards, owed all their popularity to the fact that people like stories. The American lumberjacks amused themselves during the long evenings by creating the legends of Paul Bunyan. Andersen's Fairy Tales have thrilled the children of all lands for decades.

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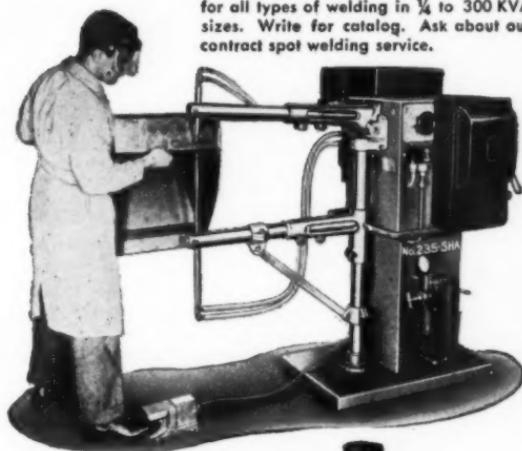
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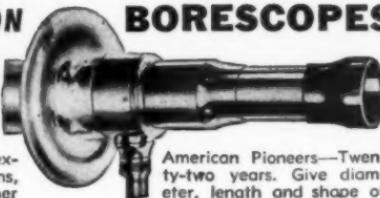
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same problems. Probably other people have had similar experiences to those which led you to talk on your subject.

### Tell them a story!

If you can find a story involving some famous person to illustrate your talk, so much the better. It is often more effective to tell the story of Napoleon eating green apples before the battle of Waterloo, to illustrate the importance of the little things in life, than just to tell of some small coincidence in the life of an average person. Or, if not a story about a famous person, a story about someone we all know is effective. A letter from an escaped prisoner in Germany who happened to be the brother of a friend of mine meant a great deal more than all the atrocity stories in the newspapers. It brought home to me personally just what was going on.

Historical illustrations are also effective. These may be in the usual

sense of "history", or they may be drawn from your own or the company's past experience, the experience of other company's etc. Use historical facts when you can.

Every once in a while you will find yourself speaking of a matter which requires you to get down to brass tacks and count noses. Before you can convince us that a problem of safety is important, we want to know how many people are affected; How much it costs us in dollars and cents to go on with present practices; how much the new proposal will save us or cost to install. When you talk about a new method we want to know how it will affect wages and costs. When you mention a public works program we want to know what it will cost and how many families will be helped. And when you use statistics, dramatize them!

Probably no more famous dramatization of statistics is on record than Ni-



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cholas Murray Butler's well known breakdown of the cost of World War I:

"The money spent by all the nations for destructive purposes of the World War amounted to four hundred billion dollars. Do you know what we could have done with that money if we had used it constructively?

"We could have built a \$2500 house, furnished it with \$1000 worth of furniture, placed in the middle of five acres

of land worth \$100 an acre, and given this entire estate outright to every family in the United States, Canada, Australia, Wales, Ireland, Scotland, France, Belgium, Germany, and Russia.

"We could have given to each city of 20,000 inhabitants or over, in each country named, a five million dollar library and a ten million dollar university. Out of what was left we could have set aside a sum at five per cent that would have provided a \$1000 a year salary for an army of 125,000 nurses and another of 125,000 teachers."

Dramatization like that takes some work, thought, imagination, some concentration, but the results are indeed worth the effort. Why? Not only because the statistics are specific, but because the dramatization puts the figures in terms your listeners can understand and appreciate. Four hundred billion dollars is almost meaningless. A home and five acres of ground for

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everyone in ten great nations really means something!

People have always been interested in finding the answers to things. "Why?" is one of the first questions a child asks. And in this calculation of possible causes and effects we resort to analogies. The life of a man is compared in detail to the life of a tree. The problem of directing the destinies of a state or a corporation are compared to the cap-

taining of a ship. Situations which can be compared in detail, especially comparisons which make use of a fairly well-known thing in explaining something abstract are very effective. When asking yourself what you know about your subject, try to think of some good analogies.

### The Novel

What do we mean by using illustrations or phrases which have novelty? Simply that people are curious, and that curiosity itself usually has sufficient force to draw their attention for at least a limited time to what you are saying. We can appeal to their curiosity by saying something which is outside their experience or knowledge, BUT, we must immediately relate it to their experience and understanding. If the ideas or facts are not soon explained in terms your listeners will understand and appreciate, they will lose interest entirely.

In using the element of novelty to gain and hold your listeners' interest, what sort of things can you talk about? Strange places, strange people, customs, new facts on almost any topic, technical terms, new twists to old ideas, unusual analogies, and other illustrations which are new, different. But remember that an idea or an illustration is not necessarily of value because it is new; that even the pulp writers of Future Science Fiction and similar stuff



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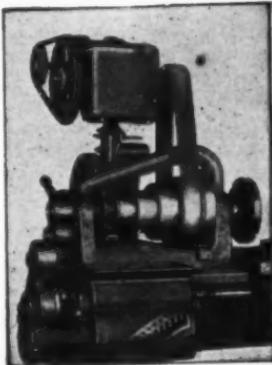
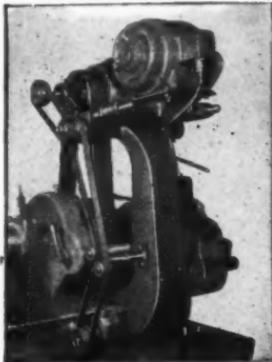
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DEPT. A

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must maintain the logical assumptions of their stories and keep their pseudo-science in a frame of understandable human thinking and emotions. The novelty must be related to other elements of audience interest to be of lasting value in getting over your message.

### Variation

Monotony of any kind kills interest. In another article I shall discuss variation in voice and manner and monotony as a whole, but it is worth noting here that monotony from the use of the same kind of material, such as nothing but analogies, nothing but statistics, can be as deadly to listener interest as any other kind of monotony. To tell one funny story after another throughout your talk may hold attention for a time, but sooner or later your listeners will want you to get down to business and say something worth listening to. Mix a story with a statistic, a historical account with some personal experience. Keep your illustrations varied and to the point.

What are you going to appeal to to get desired results from your listeners? Their basic motives and desires. What are you going to talk about? Things which are familiar to their life experience, which are specific and concrete, which occasionally are novel. And in addition you will use some change of pace, some variation in the sort of illustrations you use.

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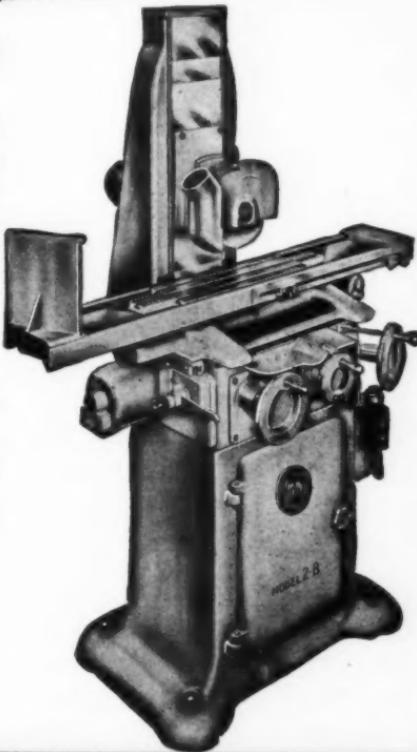
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The main problem in self-analysis to find out what you know about your subject is that of selecting the facts, the stories, the material which will be most appropriate in furthering your message. It is even more important, sometimes, to determine what NOT to say than it is to pick what you will say.

The foreman or supervisor who is seriously trying to improve the effectiveness of his speaking will do well to review in his mind everything he knows about a problem before speaking on it. The "informed" man is more respected than the "smooth talker."

#### "SANDING" PLASTICS

"Sanding" problems and considerations in connection with Plastics explains the slant of a new 16-page booklet issued by Behr-Manning Corp., Division of Norton Co., Troy, N. Y.

Pioneering in this field of instruction, the booklet completely explains abrasive

selection, machinery and equipment, buffering, polishing, etc. The entire first half of the booklet is devoted to an introduction and simplified explanation of plastics themselves. Much of the confusion in connection with the hundreds of plastics is overcome by combining similar materials into seven basic family types—two of the groups are thermo-setting and five are thermo-plastic.

Much information on the different plastics is given on a 17 x 22" three color chart which includes complete reference data on 70 of the popular rigid type plastics.

"Coated Abrasive in the Plastics Industry" will give much valuable information for anybody working in the field.

#### IDEAL INSULATION TESTER

A new instrument for checking insulation resistance in a-c and d-c equipment is announced by Ideal Industries, Inc., 1441 Park Ave., Sycamore, Ill.

Entirely self-contained, the Ideal Insulation Resistance Tester is ready for instant use anywhere. There are no batteries or external power supplies, no brushes or commutators to require attention. Necessary power is provided by a small internal hand generator, operated by slowly turning a crank.

Correct testing voltage is indicated by two small button lights that glow at 500 volts d-c. When crank is turned faster than necessary, an electronic voltage regulator controls voltage to the meter so that a true reading is obtained.

Test Range is 0-100 Megohms; Case, lightweight two piece aluminum; Meter, rugged D'Arsonval type; Test leads, 10' long; Dimensions, 3-3/8" wide x 6" long x 3-1/4" high; Weight with leather carrying case is 3-1/2 lbs.



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Mercury Steel Letters and Figures are stocked in a wide range of sizes to meet every need, and special sizes can be made to your specifications if desired. Write Department B for full details, and outline your metal marking needs for a prompt recommendation.



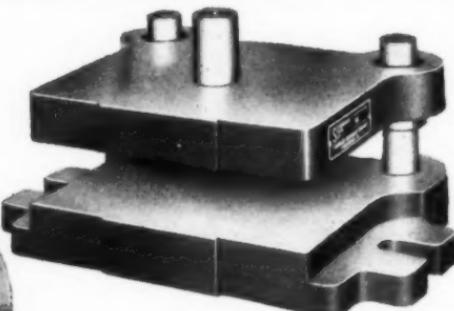
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"Standard" Model 3T is a popular, efficient power press for set-ups as large as 8" x 11½". Fitted with an improved roller type clutch; adjustable for single stroke or continuous operation. The clamp type punch holder speeds the handling of die sets. Model 3T is complete with geared head motor and has many features for safety and convenience, including two-hand safety trip and inclinable frame. "Standard" Roll Feed and Dial Feed Accessories available. Write for new Bulletin 3T.

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## the DI-SAW with Extra SPEED AND EXTRA STAMINA



Did you ever hear of a transmission going haywire on a TANNEWITZ DI-SAW? No, neither did we, though we have been making die saws for a good many years. And that's just typical of the superior construction of the entire machine. It can take the severest kind of use and always be ready for the next job. Moreover the standard model has larger wheels than customary in machines of this type — a full 24 inches — for greater traction, straighter, faster sawing and more production. Get the complete facts and you'll discover why TANNEWITZ DI-SAWS always show the best possible return on an investment in equipment of this kind. Write for "DI-SAW" Bulletin.

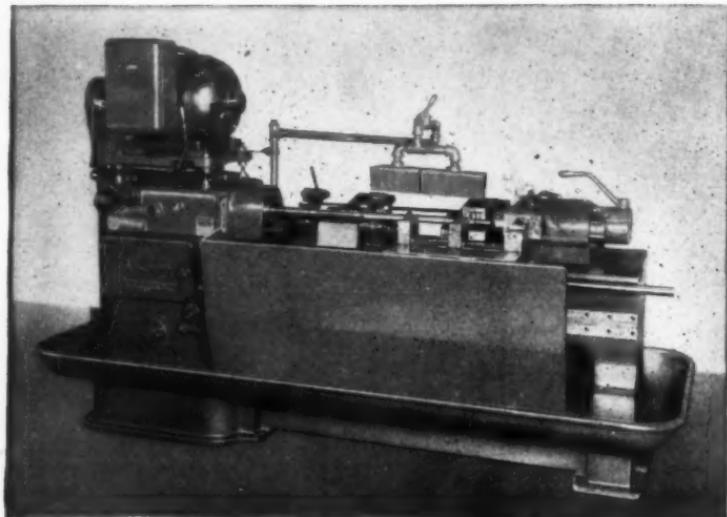
### OTHER MODELS TO HANDLE WORK OF PRACTICALLY ANY SIZE

make available the tremendous savings of inside and outside sawing, filing and polishing on dies, jigs and other work too large to handle on the standard machine. Bulletin on request.

**THE TANNEWITZ WORKS**  
GRAND RAPIDS 4, MICHIGAN

# MACHINE OF THE MONTH

REPAVED BY THE SENECA FALLS MACHINE CO. "THE Lo-swing PEOPLE" SENECA FALLS, NEW YORK

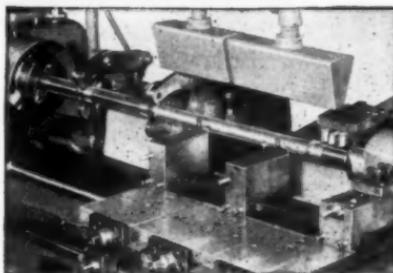


## MODEL LR Lo-swing LATHE EQUIPPED FOR TURNING LONG, SLENDER SHAFTS

**Problem:** To provide a fully automatic Lathe capable of turning long, slender tubes with sintered carbide tools.

**Solution:** In order to reduce the number of tools in contact with the work to a minimum and thus avoid distortion of the tube, this job required a machine with a specially long carriage feed.

A Model LR Lo-swing was selected for this job and equipped with a special longitudinal feed attachment permitting a maximum carriage travel of 9" which was in excess of that required for this job. The tube is held between centers and driven with a Seneca Falls Automatic Driver which assures a positive balanced drive and also prevents distortion. The work is supported with two-roller steady rests, the rolls of which are in contact with two ground spotings. One-half of the shaft is turned as shown in illustration, after which the shaft is reversed and the opposite end turned.



Another feature of this machine is the three slide carriage having independently cam-controlled slides operated through the Seneca Falls SIMPLIFIED CHANGE-OVER MECHANISM. Each slide may be set for different lengths of cuts by a simple adjustment of gear segments which are fitted with graduated scales corresponding to desired length of cut in inches.

The Model LR Lo-swing Lathe is completely automatic; the operator simply loads and unloads the work and pulls the starting handle.

## LATHE NEWS from SENECA FALLS

# Make Safety Keep Pace With Production

By John E. Caldwell, Jr.\*

\*Engineer, American Mutual Liability Insurance Co.

**N**O PROGRAM can be regarded as infallible or as a cure-all for every plant's present or future ills. Neither can it be expected that, once set up and functioning, a program can carry on of its own momentum and adapt itself to changing conditions with little or no supervision, periodic analysis or revision. Changing conditions are always a challenge to management. Progress often lies in the ability to recognize change and to adapt plant methods and procedures to meet new requirements. When management exercises this ability, the result usually can be measured in terms of increased productivity and reduced unit costs.

## Safety & Production

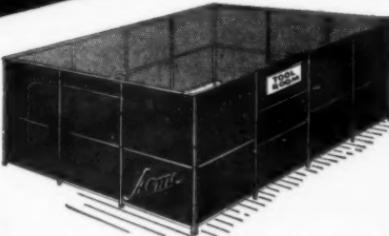
Much too often safety is regarded as completely unrelated to production.

Actually, safety is tied up inseparably with the production program. A step-up in production requires a corresponding step-up in safety activities. A revision in manufacturing methods compels a corresponding keying of safety methods to meet the new requirements. To ignore these facts is to invite the delays, the spoilage of materials, the cumulative charge on idle machines, the loss of skilled employees, the deterioration of employee moral and other undesirable results of industrial accidents.

When the war increased their production activity and with it the level of employment, The Blanchard Machine Company of Cambridge, Massachusetts, manufacturers of vertical surface grinders and special machinery, soon noted an increase in the frequency and severity of accidents in their plant. A re-

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Standard Sections Woven Wire Mesh Panels and Doors to enclose Tool Cribs, Stock rooms and other enclosures.

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3519 E. CANFIELD      DETROIT 7, MICH.

view of the problem revealed that despite extensive safeguarding and a desire to avoid as many accidents as possible, their safety program was not adequate to meet their new requirements. Furthermore, at the time no one had been given the assignment to head up their accident control activity. Thus, while no one wanted accidents, there was no co-ordinated action to prevent them.

#### Field Accidents

It is an axiom in the field of accident prevention that the control of accidents in any plant must stem directly from an expression of policy by management. Its cognizance of the problem and determination to meet it is the first and most important step in accident prevention. Accident control is effective only when it is clearly understood to be a part of company operating procedure. The Blanchard Machine Company recognized this fact and proceeded to solve their problem in the most effective way possible, from the top down.

The remnants of an earlier safety

program were intact; if relatively inactive. It was necessary to put life into the set-up by first defining the objective of each element and by stressing that safety is an integral part of production and as such, part of the job assignment of every employee. To fill the particular need at this plant two items of organization were decided upon:

1. The appointment of a qualified key employee to serve as a safety director, with the full backing and co-operation of management, to co-ordinate safety activities and to spark, and develop, the new program.
2. The development of an energetic safety committee to determine the plant's accident prevention needs; educate themselves, management and other employees in how to prevent accidents; and to advise action in accordance with their findings.

A key supervisor was assigned the staff job of safety director in addition to his usual duties. The choice of safety director at Blanchard was a fortunate one. Safety conscious and possessing a keen interest in safety, he went about his



## Power and Foot Operated...

**TAYLOR & FENN** Spring Presses are used for Riveting, Staking, Stamping and similar operations on small, light parts. They are constructed to compensate for variation in thickness of the work and to deliver repeatedly a **UNIFORM BLOW**.

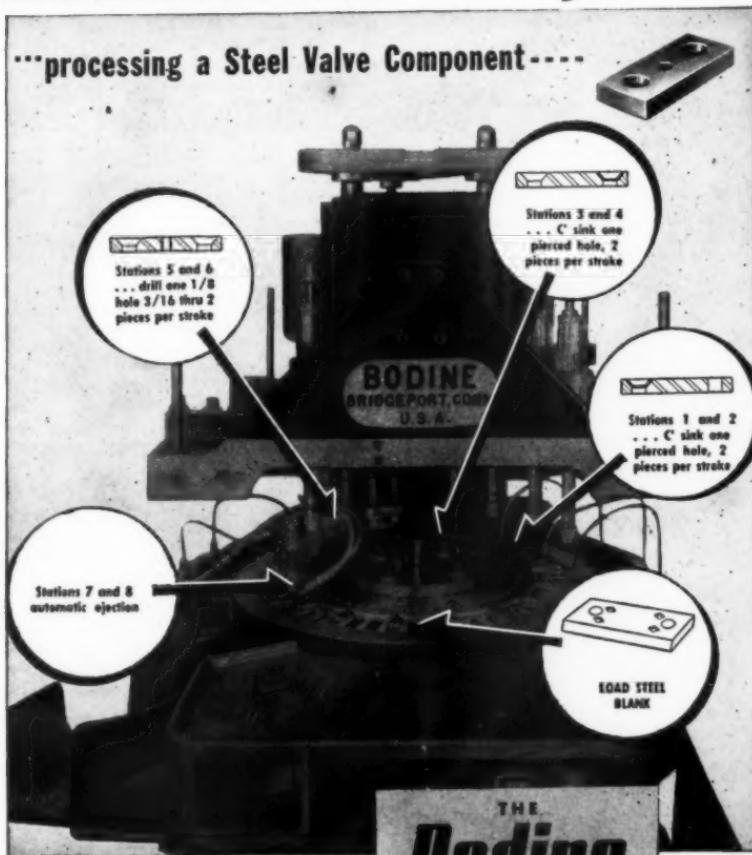
M-110 (illustrated) powered by a small reducer with a one-sixth H. P. motor, is designed to eliminate the fatigue factor inherent in foot operated Presses. A similar Press, M-120, of the same size and capacity is equipped to operate by compressed air.

**OTHER MACHINES MANUFACTURED:**  
Vertical Millers  
Duplex Spline Millers  
Medium Duty and High Speed Sensitive Drilling Machines

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# Bodine..Case History № 17

## ---processing a Steel Valve Component---



• Production 1800 pieces per 50 minute hour...2 pieces per stroke on this Bodine 6 spindle Drilling Machine. Bulletin on request.



added duties with a vigor and enthusiasm that was infectious. In addition to sitting on the safety committee, he obtained and supplied information on accident prevention, developed inspection procedure and assisted in the investigation of potential and existing hazards. He accumulated the data and charted the progress of accident prevention in the plant. In this way, he was able to guide and channel the course of the safety committee so that its deliberations were objective and aided each department in the plant to control accident causes.

It was generally agreed at Blanchard that a large measure of the success of the safety program lay in the functioning of the safety committee. By reason of its makeup (management and supervisory personnel), its recommendations and action established and guided administration of safety policy. Convinced of the need for co-operative action, it provided the impetus required to stop accidents. Safety meetings were held weekly. Opinions and suggestions offered by members of the safety com-

mittee were accepted at their face value irrespective of the official capacity of the contributor. This developed a spirit of co-operation and gave each member a feeling that he was making a worthwhile contribution to the overall effort. Initial meetings were designed to sharpen interest and to develop an understanding of the fundamentals of accident prevention. Later, the meetings were broadened to include participation by "anyone who could teach us anything about safety or offer us any aid in accident prevention."

It was realized that the foreman is the key to accident prevention in his department. Administration of a safety program at departmental level rests with him. To enlarge his knowledge of accident prevention and enable him to recognize conditions which must be controlled if accidents are to be prevented, the writer was called upon to present a foremen's safety course at Blanchard. Familiarity with the plant, buttressed by recent inspection and analysis allowed the writer to present the course in the light of their specific

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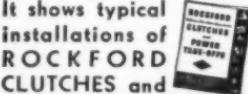
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PULLMORE



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It shows typical installations of **ROCKFORD** **CLUTCHES** and **POWER TAKE-OFFS**. Contains diagrams of unique applications. Furnishes capacity tables, dimensions and complete specifications. Every production engineer will find help in this handy bulletin



\* When the powerful engagement of PULLMORE Multiple-Disc CLUTCHES is released, declutching is instant and positive. The perfectly flat, floating discs separate and ride free — without drag,

heat or abrasion. This positive neutral is especially valuable in rapid-operating, multiple-cycle machines.

**ROCKFORD CLUTCH DIVISION**

1309 Eighteenth Avenue, Rockford, Illinois, U. S. A.

BORG-  
WARNER

# The Right BUR for the Job

BLEND STRAIGHT, CONCAVE  
OR CONVEX SURFACES WITH

## Shape "S"

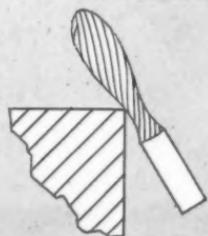
### FLAME

Blending irregular surfaces on castings often calls for a bur which can handle concave and convex as well as straight surfaces. Shape "S" KELLER Bur is "Bi-shaped," with a combination of concave and convex radii for easier, more versatile operations on difficult surfaces. Another use is for removing stock from sharp corners. Pratt & Whitney KELLER Burs are ground from the solid, *by machine*, to give dependable, smooth-running service and long life. Write for full information on the complete line.

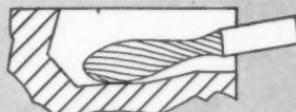
Shape "S" is available in  $\frac{1}{4}$ ",  $\frac{1}{16}$ ",  $\frac{3}{16}$ " and  $\frac{1}{8}$ " diameters, to permit working in very small areas. Surface is fine, medium, or coarse cut.



Concave radius removes stock from a sharp corner.



The convex grinding radius blends this irregular contour easily, swiftly.



**PRATT & WHITNEY**  
Division NILES-BEMENT-POND COMPANY  
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**WEST HARTFORD 1, CONN.**

needs. Supervision improvement was stressed as an outstanding need. Due to the employment of new and "green" workers, it was pointed out to the foremen that understanding supervision was required to teach the new employees to do their work safely. It was brought out that over 60 per cent of the lost time accidents involved handling material. In this connection it was explained that foremen could help control this situation by the education and follow-up supervision of employees.

Limited space, the installation of new machinery and increased employment accentuated the need for good housekeeping. Foremen were impressed with the fact that due to the restricted available working area, it was more than ever important that aisles be kept clear and that materials be stored in accordance with plan. The foreman's responsibility for suggestions and requests for maintenance service and physical safeguards to improve the safety and productivity of his work area was emphasized.

Safety committee meetings should provide not only education through instruction and the exchange of information, but the solution of specific problems through the pooling of ideas. Two specific problems confronted the safety committee at Blanchard. It might be well to review these to show that recurring injuries, if investigated and analyzed, can be minimized, if not eliminated, by prompt, co-operative action. For instance, the writer attended a committee meeting devoted entirely to the problem of eye injuries in the plant. It was noteworthy that the meeting was attended by two employees who had expressed dissatisfaction and unwillingness to wear goggles on the job. It is, of course, usually impossible to include all employees in group discussions of safety policy, but it is an effective and progressive management that endeavors to get that policy and the reasons back of it across to all employees by that method. It demonstrates a willingness to listen to and understand the employee point of view and, if well conducted, results in a decided lift in em-



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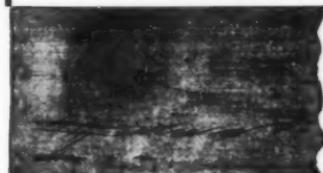
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# What is DIE-LESS DUPLICATING?

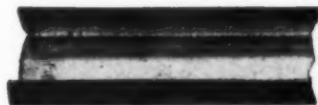
Here is a simple 3-STAGE explanation:

"DIE-LESS DUPLICATING" might be described as a new industrial technique made possible by the accuracy, extreme adaptability and ease of operation of DI-ACRO Precision Machines — Shears, Brakes, Benders — especially when used as a continuous, integrated production process.



## ← 1st Stage

Cutting flat material to size and shape for part to be duplicated. The DI-ACRO Shear rapidly resizes and squares material, also makes slits, strips, notches, angle cuts, etc. 3 sizes.—shearing widths 6", 9", 12".



## ← 2nd Stage

Forming angles, channels or "Vees" from sheared flat material. The DI-ACRO Brake forms any angle from 0° to a maximum of 110°. 3 sizes—folding widths, 6", 12", 18".



## ← 3rd Stage

Bending sized and formed material to simple, compound or reverse curves of desired radii. The DI-ACRO Bender handles angle, channel, moulding, rod, tubing, wire (round, square flat), strip stock and other ductile materials in a remarkably wide range of accurate con-



tour forming. 3 sizes.—radius capacity 2", 6", 9", handling up to  $1\frac{1}{2}$ " cold rolled steel bar.

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The DI-ACRO System of METAL DUPLICATING WITHOUT DIES has proven its adaptability in making parts just as accurately as can be done with dies, to a tolerance of .001" in all duplicated work. The delay of waiting for dies is avoided — deliveries speeded up.

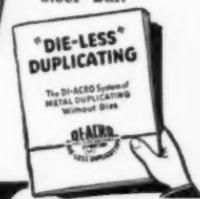
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It gives full details on all models of DI-ACRO Shears, Brakes, Benders, and many examples of parts made with "DIE-LESS DUPLICATING".

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ployee morale and co-operation. As a result of this meeting and the recommendations of the safety committee, in two month's time a high frequency of eye injuries was reduced almost to zero.

The major problem needing immediate solution was the handling of materials. Despite such mechanical aids as overhead cranes, chain falls and hand trucks, as stated earlier, handling of materials was responsible for two-thirds of all lost time accidents. This was attributed largely to increased production and space restrictions. The safety committee recommended education and closer supervision as the antidote. The effectiveness of their recommendation and the resulting action was dramatically illustrated when in a period of 4 months, handling of materials was drastically reduced as a source of lost time accidents.

Plant inspection procedure was developed and carried out by members of the safety committee to provide a check on existing conditions and to search for any condition which might breed potential accidents. Findings were discussed, at the safety meetings, for recommendation and action.

Retrospection can be prevention! True, an accident can not be prevented once it has happened, but complete investigation, analytical study and appropriate recommendation and action can prevent recurrence. At Blanchard, the safety committee investigated accidents thoroughly, studied the conditions and causes surrounding them and recommended action to prevent their recurrence. They followed this up in subsequent inspections and reviews to see that their recommendations were carried out.

The Blanchard Machine Company had long maintained a well-equipped first aid room adequately staffed with a registered male nurse. The setup was wholly adequate to administer to employees in need of treatment as a result of minor injuries. However, lack of care of their injuries by employees after receiving first aid treatment and limited co-operation by employees in reporting minor injuries for treatment in the initial stages of the new safety program

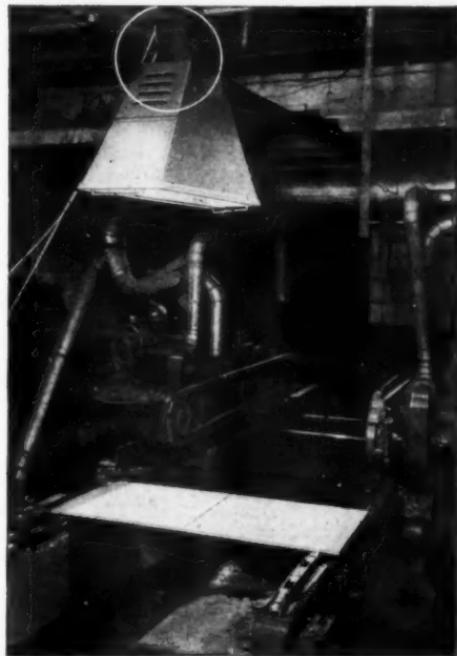
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— **Brilliant WHITE Lights**  
that throw a  
**SHARP, BLACK**  
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Write today for FREE complete information on this modern, tested, time-saving equipment.

## CARTER PRODUCTS COMPANY

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spurred the committee to accelerate employee education on importance of first aid.

Many devices were used to stimulate employee interest in safety. Old and new employees were assisted within their departments to do the job the best way—which is the safe way. Bulletins were used strategically but not in excess. Payroll inserts, in the form of a dollar bill, carried safety messages which touched on current problems. The showing of sound slide films helped to stimulate interest in safety. Displays were presented to inform employees of safety progress and warn them against hazards.

Too much credit cannot be given to Blanchard Machine Company for their handling of their accident prevention problem. They are a convincing example of what can be accomplished when the management of a progressive plant realizes that safety problems are production problems; that safety and production are inseparable. The Blanchard Machine Company was not only the recipient of the group banner in

the Massachusetts Industrial Safety Contest but was also a five time winner of the Army and Navy "E" award. In a period of less than 2 years, their lost time accident frequency was reduced by more than 65%. Thus has a progressive concern demonstrated that in days of rapidly changing conditions it is imperative that safety keep pace with production and that the objective is attainable by reasoned action.

#### SUNNEN DRESSING TOOL

This new Sunnen tool is especially designed to increase honing speed by keeping stones at top-cutting efficiency.

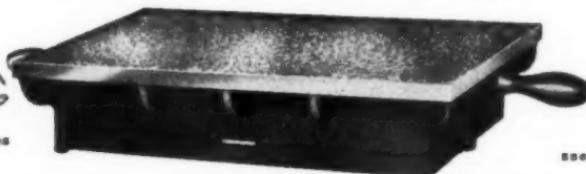
It quickly breaks the glaze and restores cutting action without wearing the stones out-of-true or fracturing the bond. It is used by pulling it very lightly over the full length of the stone surface in one stroke.

A chain is hooked to a ring fastened to the end of the diamond dressing stick and, by means of this chain and a bracket, the unit can be attached to the honing machine, ready and handy for use when needed.

Address Sunnen Products Co., 7935 Manchester Ave., St. Louis 17, Mo., for further details.



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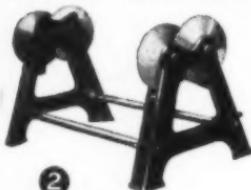
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# Ten Million Dollars Worth of Machine Tools For Only One Manufacturer

As this is written the final arrangements are being made, consummating a five year lease on a former War Plant, which will mean the acquisition of the \$180,000,000 Dodge plant in Chicago by Preston Tucker, Ypsilanti, Mich., machine tool manufacturer. Tucker will use the plant for the production of automobiles and will provide jobs for 35,000 Chicagoans and put back into operation the largest manufacturing plant in the world, larger than the Willow Run plant in Detroit.

The lease of the huge Dodge plant, a white elephant in the hands of the War Assets Administration, is now only awaiting the approval of the Department of Justice.

## To Build New Type Car

A new car, to be known as The Torpedo, which will differ in many respects from the conventional type of car, will be built in the plant. Some features include a 150 horsepower rear-end engine with a four-wheel power hookup, and a liquid coupling device similar to the fluid drive of Chrysler and the hydramatic drive used by Oldsmobile and Cadillac.

The transmission, drive shaft and differential have been eliminated, thus saving from 600 to 800 pounds weight. With the engine largely made of aluminum and a body of the same metal, the over-all weight is expected to be about 2,000 pounds, or about 1,000 pounds less than the conventional model of the same size.

## Terms of Lease

Under the terms of the five-year lease, the Tucker Corp. will pay \$600,000 the first year; \$800,000 the second year and \$2,400,000 for each of the third, fourth and fifth years.

In addition, Mr. Tucker gets an option to purchase the properties for \$30,000,000 which must be exercised before the expiration of four and one-half years.

Mr. Tucker made no disclosure of his financing plans except to state that the corporation might market a preferred stock issue after automobile production has begun.

Machinery and equipment to be used will remain in the plants, and separate negotiations will be held for lease of these machines and other equipment. This machinery also can be purchased by Mr. Tucker at any time prior to the termination of the lease. Whatever equipment is not to be used will be removed at government expense.

Besides his machine tool interests, Mr. Tucker has been interested in and has built racing automobiles.

## Production by September

The Tucker Corporation will complete inventories at the big war plant in September and begin production of the Torpedo six to eight months later, according to Mr. Tucker.

## Tools Needed Now

"Our men have been in the plant for the last two months working on the in-

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ventory," said Tucker. "We received the plant virtually intact. Chrysler took out comparatively few of the 18,000 pieces of machinery in the place."

Ten million dollars will cover the cost of new tools and machinery necessary to carry the plant to its first production goal of 200 cars a day, said Tucker.

### Estimate on Production

"We hope to achieve a daily rate of 200 cars by the end of the first month, 300 by the end of the second, and 500 by the end of the third," he said.

Eventually he expects to produce 1,500 of his aluminum bodied engine-aft Torpedo cars every day. At that rate the plant would turn out more automobiles in three weeks than it did aircraft engines in the entire war.

### Competition from Kaiser?

According to reports from Paris, Henry J. Kaiser has acquired the production rights in the United States of the latest front wheel drive French car, the French news agency said. The largely aluminum car will weigh less than 1,000 pounds, will have a maximum speed of 55 miles an hour, and will travel 60 miles on a gallon of gasoline.

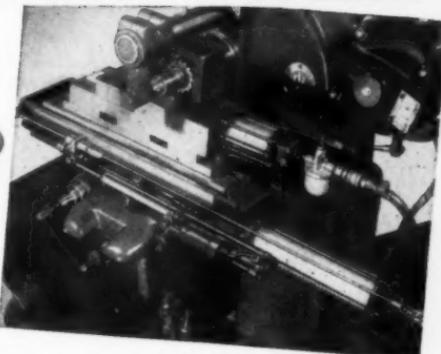
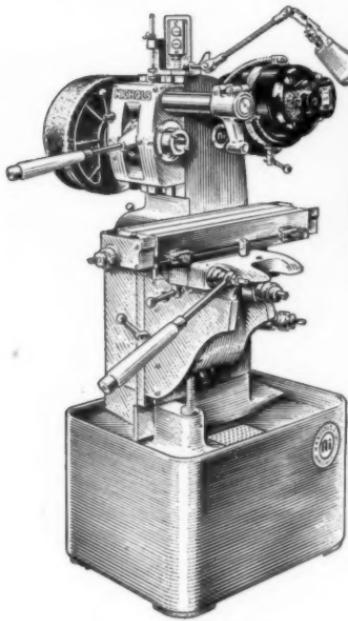
### Can You Answer This One?

A question that suggests itself is: Are The Big Three, Ford, Chrysler, and General Motors, going to meet this competition? If they are, the machine tool builders should be happy.

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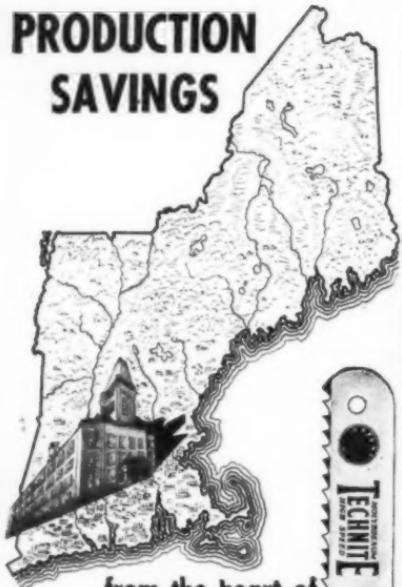
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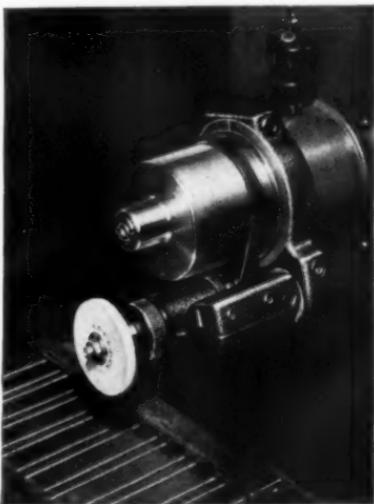
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Universal Engineering Co., 2230 National Ave., San Diego 2, Cal., offers a highly flexible tool for drilling and tapping in one operation at the same station. This is accomplished by incorporating a reversing tapping head in one of the three positions of their three-position Drill Press Turret Head.

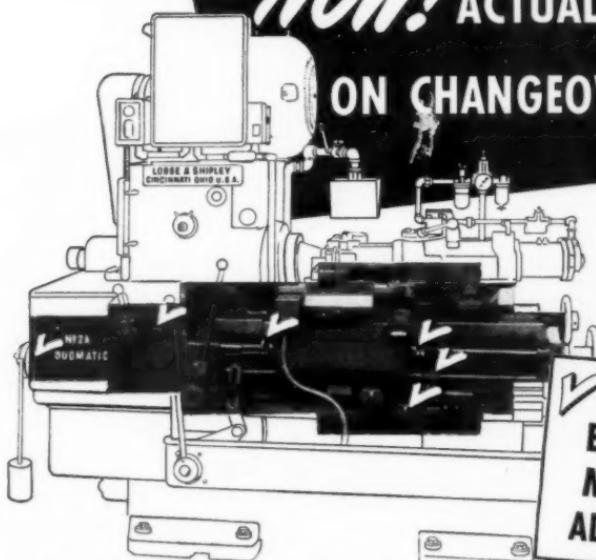


This head is of the positive clutch type drive. Drive dogs are made of hardened Chrome Vanadium steel. The collet type chuck made from Chrome-Moly steel was adopted instead of standard tapping chuck for accuracy and rigidity. Collets for all size taps from No. 8 thru  $\frac{1}{2}$ " are furnished with the tapping head. These collets are made of alloy tool steel, hardened properly for correct holding power and spring back. Collet chuck and its spindle are made in one piece. Spindle is precision ground for proper fit and running action. Gears used in the reversing mechanism are extra heavy. Thrust load is carried thru ball thrust bearings. Housing is made of double strength, close grain Dural.

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This tapping head is available as a unit to fit their Turret Heads now in use, as

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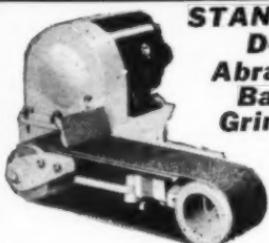
Handle universal work, make unbelievably fast savings in changeover time and production with the 2A Duomatic. There are no cams. Simple, mechanical adjustments (note arrows) eliminate costly, time-wasting cam changes. This "Job-Shop Automatic" performs in minutes work taking hours on engine lathes.

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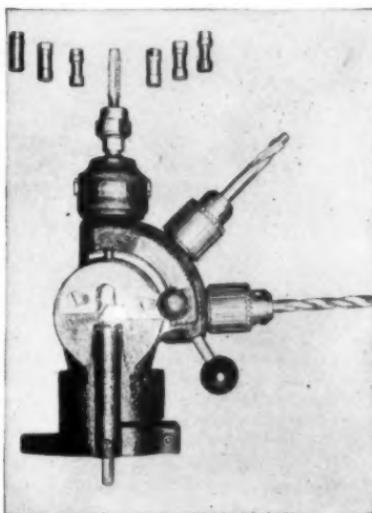
Also Manufacturers of IDEAL Mechanical  
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a component part of their new Turret Tapper and as a single unit Tapping attachment for all popular modern drill presses.

**STAFFORD "BLITZREV"**

A new high-speed surface grinder attachment, known as the Stafford "Blitzrev", is made by the D. & S. Model Co., 3114-32 E. 3rd St., Dayton 3, Ohio. It can be installed in five minutes on most standard makes of surface grinders and permits the operator to use small grinding wheels from  $\frac{1}{8}$ " mounted quills to 3" diameter wheels. Speeds of 10,000 and 15,000 rpm are attainable with the standard 2-step pulley. A special pulley is obtainable if higher speeds are required.



An air flushing principle is used whereby a fan mounted on the revolving shaft inside the housing sets up an airflow outward, preventing entrance of dirt and dust. For obtaining parallel surfaces on gages and dies, this attachment fills many a difficult operation need.

A drive pulley is mounted on the surface grinder spindle, replacing the standard 7" wheel. This pulley, by means of a belt, drives the high speed spindle of the Attachment. A dovetailed arrangement allows a forward and backward movement of the "Blitzrev" Attachment, permitting grinding over the full surface



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of the magnetic chuck with a 2" diameter wheel. Attachment may also be swung thru  $360^\circ$ , allowing grinding farther to left or right, increasing the capacity. Six standard quills and proper wrenches are furnished, and the complete unit is placed in a neat wooden chest.

Incidentally, this company has acquired rights to the manufacture and sale of the Rieger line of small tools, comprising the Multifacer, Circle Cutter, Spindle Stop, and Die Holder.

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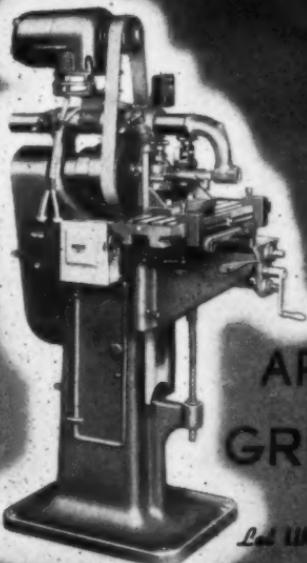
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On drilling operations the Opti-Setter is inserted in a drill jig, which is adjusted until the crosslines coincide with any desired layout mark on the workpiece. Drill Jig is clamped in position and the Opti-Setter removed. A drill bushing of correct drill size is inserted in jig and drilling operation is then completed. Locating ac-

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curacy is equal to the layout whether holes are machine drilled or made with a portable hand drill.

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It is supplied in two popular sizes:  $\frac{1}{2}$ " diameter x 3" long—and  $\frac{3}{4}$ " diameter by 3" long—and is manufactured by The Benton Co., 351 South La Brea Ave., Los Angeles 36, Calif.

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The Sapphire Products Division, Elgin National Watch Co., Aurora, Ill., offers a new outside micrometer tipped with Sapphire. It is reported that the original micrometer produced is in constant use in a drill plant after 2,000,000 production gaging without showing appreciable wear.



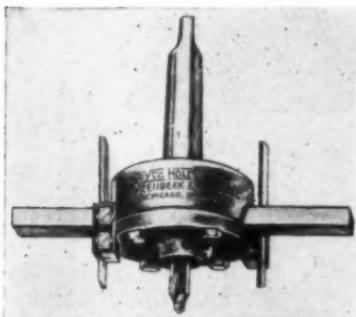
These micrometers, the anvils and spindles of which are tipped with Sapphire, are available in one to six-inch sizes; English and Metric styles. Accuracy is guaranteed within 0.0001".

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This company also makes a hole cutter for electric drill, drill press, or carpenter's brace. It fits any  $\frac{1}{2}$ " drill chuck, is quickly adjustable, and self-tightening. It is for cutting round holes in sheet metal, bakelite fibre, etc. It has no clamps, wedges or set screws. Standard drills and tool bits are used.

The hole cutters are furnished with hardened pilot pin, but can be used with a pilot drill, if desired.

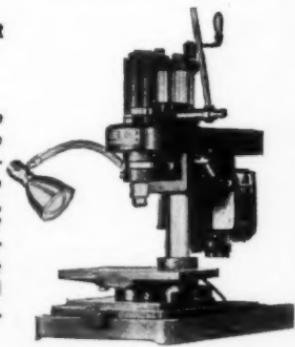
#### ARO $\frac{1}{2}$ " DRILL

A new air-powered  $\frac{1}{2}$ " drill, Model 7016, has been developed by The Aro Equipment Corp., Bryan, Ohio.

Built to the specifications demanded for heavy duty, continuous-production jobs, yet it is said to be 40% lighter in weight than other drills of the same capacity. Lighter weight makes the tool easier to

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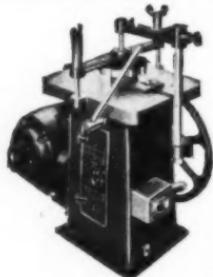
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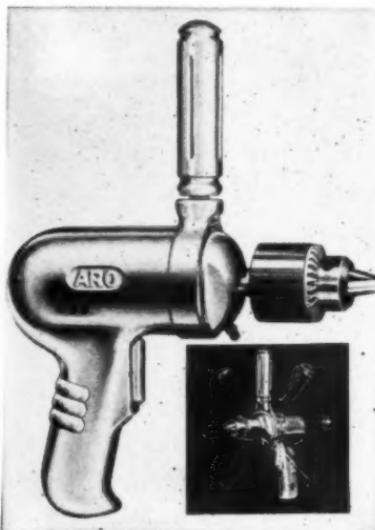
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handle, and is important in reducing operator fatigue. Ample power is provided for stall-proof operation on jobs of drilling, reaming and countersinking.



The drill is equipped with an auxiliary handle that can be instantly located in any position around nose of the tool. To locate handle in new position, operator loosens handle with  $\frac{1}{8}$ th counter-clockwise turn, moves to desired position, then locks handle securely by  $\frac{1}{8}$  clockwise turn. This feature saves time and increases versatility of the tool for hard-to-get-at drilling jobs.

The new drill is equipped with the Aro safety throttle trigger that allows operator to start and stop tool with a minimum of effort. Other features include extra large, heavy duty ball bearings which cushion action of all moving parts and contribute to long life operation . . . rotors, cylinders and gears made of alloy steels ground to precision tolerances . . . and built-in automatic oiler. Speed is 1000 rpm; weight,  $6\frac{1}{4}$  lbs; overall length,  $8\frac{5}{8}$ ".

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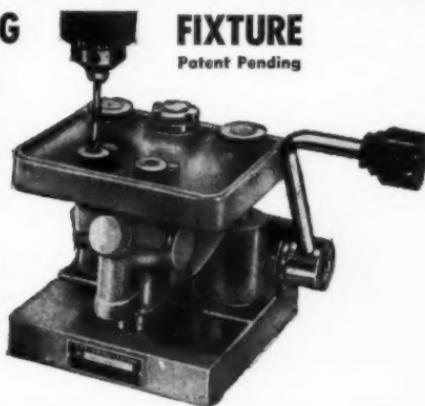
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ticle method. This gage is especially useful for large casting and forgings.



This gage eliminates inconsistent results which are often caused by irregular field strengths. It is small, portable, and operates on a-c or d-c wherever 115 volt, 60 cycle power is available. The relative size and shape can be seen in the illustration. Further information may be obtained from the Apparatus Dep't., General Electric Co., Schenectady 5, N. Y.

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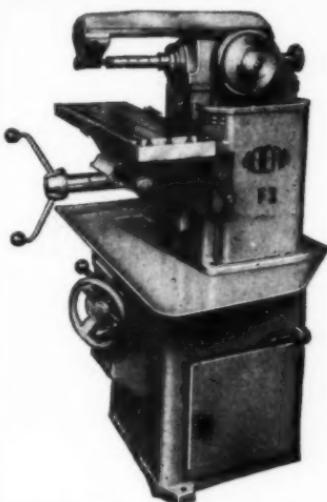
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The compound is marketed by the Engis Equipment Co., 431 So. Dearborn St., Chicago 5, Ill., and the Sapphire Products Division of Elgin National Watch Co., 932 Benton St., Aurora, Ill.

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Designed for general brazing service, a new 20-kva portable brazer with water-cooled tongs is announced.

Enclosed in a circular steel housing, entire unit is self-contained, having a contactor for energizing or de-energizing the brazing circuit, an adjustable heat brazing transformer, and a water-cooling system for the tong cooling water. Diameter is kept small (24") so it can be

lowered thru hatches, watertight doors, and manholes. A clamp type entrance bushing is provided on rear of brazer for the incoming primary cable. The unit



requires only connection to a 220-or 440-volt power source.

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# Advancing the Art of Milling

By H. A. FROMMELT\*

ALTHO carbides were introduced to American industry in 1928, the principal gain was in reduction in cutting time. For the most part, the operations necessary to recondition cutters have remained unaltered since the advent of high speed steel milling cutters in 1907. Remarkable improvements meanwhile have been made in machine tools, particularly milling machines. But it has required approximately the same time to recondition a cutter and to re-establish a setup today as 25 years ago.

That was true until Kennamilling was made available to American industry. Kennamilling is a combination of Carbide and a technique built around a cutter design that makes possible radically new and different blade grinding and blade setting methods. The overall aspects of this innovation

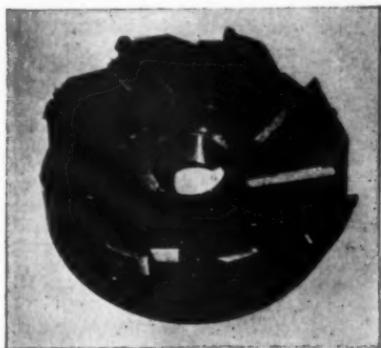


Fig. 1—Eight-inch diameter face Kennamill.

will be discussed in this issue. Details of application to a wide variety of materials, as well as types and models of machines will be presented subsequently.

Fig. 1 presents an 8" diameter face Kennamill that will serve the purpose

of our present discussion, and is typical of a line of standard cutters of from 4" to 12" diameters. The first radical feature is the use of solid Carbide blades,

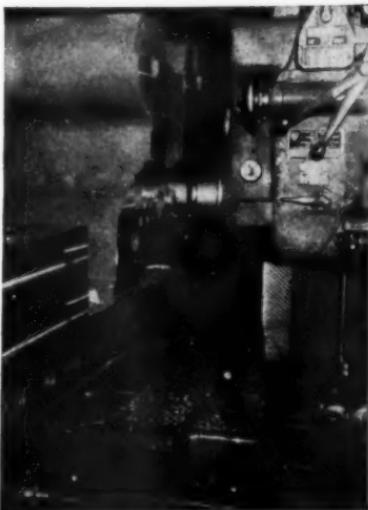


Fig. 2—Six-inch face mill taking .400" deep interrupted cut at 33 Ipm or .016" chip load.

mechanically wedged and securely held against all cutting pressures. The use of solid Carbide blades is justified, in the first instance, because of the economics of this cutting material. Production cost has been reduced thru American mass production methods since its original importation from Europe. Now it may be used in large solid blades, so designed that they can be adequately held by mechanical means rather than brazing.

Since Carbides now may be used in solid blades (5/16 x 9/16 x 2 1/2"), other

• • •

\*Industrial Research Div., Kennametal, Inc.



Fig. 3—Setting blades to the shoulder of a fly-cut taken in the workpiece.

desirable features in milling cutter design are possible. Thus, brazing strains are eliminated and the effect of raising temperatures on the shanks or bodies is obviated.

The mechanical holding of blades brings to the production line, Carbide with its full and original strength. Moreover the tool shank or body can be heat treated to 175,000 PSI as has been done for the body shown in Fig. 1. Regardless of the forces to which the cutters will be subjected, the backing up effect of the body material being at maximum strength will prevent deflection and distortion of the Carbide blades. Heavier chip loads, higher feeds and deeper cuts are therefore possible. This is indicated in Fig. 2 where a .400" deep cut is being taken by a 6" face mill.

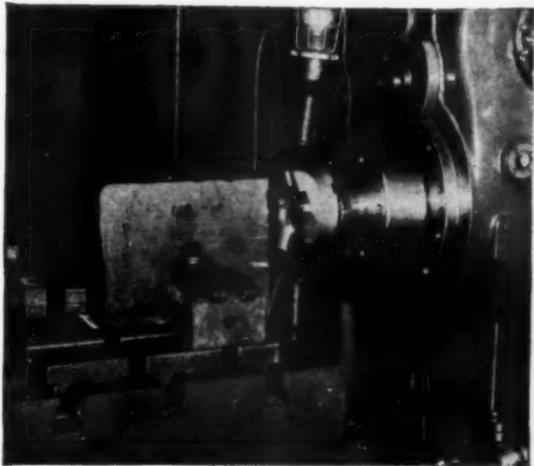
Perhaps the most striking advantage is in the reconditioning of this cutter. With a brazed tip design, a broken tip calls for these time-consuming operations:—the broken tip is unbrazed and replaced by a new tip; the shank or body is permitted to cool, carefully protected from drafts; the shank is replaced and the cutter then made ready for grinding; since the new tip is considerably larger than the other tips a

large amount of grinding is necessary to bring it into the same OD circle as the others; and, finally, if the same tooth pitch is to be preserved, which is desirable, a considerable amount of grinding on the face of the tip is required.

Contrast this with the simplicity and ease with which a broken blade is replaced when individual wedged blades are used. Without removing cutter body from spindle or arbor, a blade ground, as will be described subsequently, is set in position to the shoulder of a cut taken by the remaining blades. Less than one minute should be required to remove a blade and not much more to replace it. Meanwhile the body has remained in position, eliminating setup time in a cutter grinder by means of which additional errors might be ground into the cutter.

The solid Carbide blade construction permits maintenance of the same diameter at all times. A freshly ground set of blades replaces a dull set by the simple process of extending the first blade an amount equal to the desired radius. The remaining blades are then set to the shoulder of a fly cut taken by this first blade and as indicated in Fig. 3.

Fig. 4—One blade is shown in position to take the fly-cut.



Associated with this method of blade setting is the important advantage of grinding only Carbide. In the brazed tip designs, both steel and Carbide at times must be ground. This results in loaded diamond wheels which means friction and this in turn, heat and thermal shock to the carbide. The solid, mechanically-held blade construction eliminates these disadvantages; nothing but Carbide is ground during the reconditioning of these blades.

Reference has already been made to the ease of setting these blades. Assuming a set of blades to be dull from use, this simple procedure effects the reconditioning of the cutter without disturbing its position on the arbor, spindle or bar.

The blades are removed by loosening the Allen screws with an Allen wrench. This requires less than three minutes for the eight blades in the case of an 8" diameter face mill. Next, one blade of the freshly ground set is placed in any slot with any wedge. The extension of the blade, unless a specific diameter is to be maintained, is approximately  $1/32"$  which provides maximum blade support. This blade, after firmly seating against the slot bottom, is wedged with a torque pull of 300-inch-pounds

for which a Torque wrench is used. A small fly cut (or a radial cut) is now taken with this single blade as shown in Fig. 4. Finally all other blades are set to the shoulder of this fly cut and wedged in the manner just described for blade No. 1.

Less than four minutes should be required to set the eight blades of an 8" diameter face mill in the manner just described. No special skill or experience is necessary. Moreover having set the blades in this manner, all errors of run out in the spindle or arbor are eliminated. When the fly cut is taken with the single blade, the machine forms its own gauge, registering any inaccuracies in run-out or bearing play. So long as the operation continues, for which the set up was originally made, the cutter body need not be removed. The operator or setup man replaces the worn blades with a set of freshly ground blades in less time than it would be required to remove the body and replace it with reconditioned cutter.

Fig. 5 represents the operation of setting the blades to the shoulder of a fly cut. These blades are then tightened with a torque wrench. The simplicity



Fig. 5—Setting blade to the shoulder of a fly cut.

and ease of these operations is evident from the illustrations.

Such hand setting of blades as just described is possible only with a precision built cutter body which has now become a precision tool holder. Tolerances are such that all blades are interchangeable with all wedges and any

combination of wedges and blades will fit any spot. More important still, all slot bottoms are in the same plane to within a few "tenths." Thus, when the

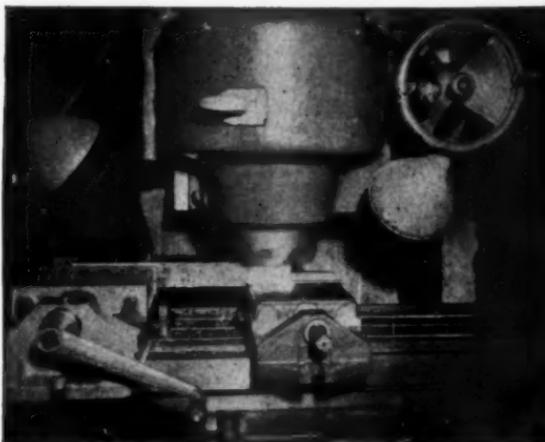
Fig. 6—Grinding blade in a block or jig.



Fig. 7—Straddle milling with solid mechanically-held carbide blades.

blades are set to the shoulder of a fly cut, the OD's of all blades are in the same circle to within an average of  $.0003"$  run out. It is important that the OD of each blade be set on the shoulder of the fly cut leaving the face to come where it will. But if all slot

Fig. 8—Milling steel at 60" IPM.



bottoms are in the same plane and all blades are ground to the same height, then the cutting faces of all blades set in a cutter body so constructed will fall in the same plane to within a reasonable amount of run out.

The method of blade grinding will be described in detail in a subsequent article. For our present purpose it is sufficient to refer to this method in brief. Each blade is ground in a grinding

block or jig (see Fig. 6) into which all angles both cutting and clearance have been incorporated. Thus the blades are automatically ground to the required angles and the heights of all blades are the same. This grinding sequence consumes approximately 12 minutes for the eight blades in an eight inch diameter cutter. A single blade, if broken accidentally or otherwise, is replaced in a minute or two without disturbing the milling operation in the slightest.

Fig. 9—Milling cast iron at 60" IPM.

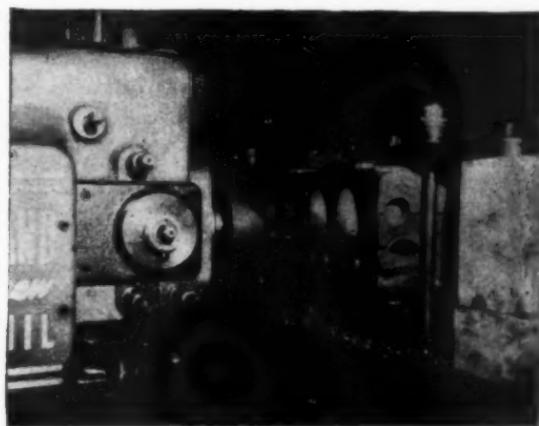




Fig. 10—Milling Dural with an 8" diameter face mill.

In an arbor arrangement, particularly for straddle milling (see Fig. 7) the time-saving is most marked. Dull blades are replaced with sets of freshly ground blades in a matter of a few minutes without disturbing the dimen-

sional accuracy incorporated into the original setup. In the older technique, the time consumed in replacing cutters to close-job-specifications required an hour or more. In addition, all errors in an arbor used for straddle milling

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Fig. 11—Milling Magnesium alloy at 6000 rpm—300" per minute table feed.



are eliminated by the method of setting the blades to the shoulder of a fly cut. And these errors can be considerable in such an arrangement.

Finally, this design permits taking heavy, rugged cuts without damage to the solid Carbide blades which are at

full strength and have adequate support and backing. Steel and its alloys in the heat treated state can be milled at 60" per minute and more, as has been done where equipment with sufficient power is available. This is shown in Figure 8 and 9, portraying a face mill-

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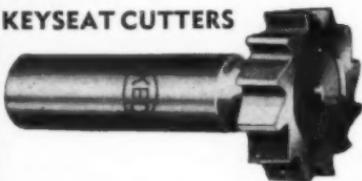


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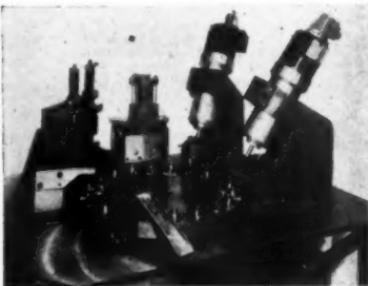
19326 Woodward - Detroit 3 Mich.

ing cut on cast iron of 50,000 psi at 60" per minute. Cuts to a depth of  $\frac{1}{2}''$  are possible with these solid Carbide blades. This is well illustrated in Fig. 2 where a .400" deep cut is being taken in cast iron on a workpiece with numerous interruptions.

And the same cutter body or precision tool holder is applicable to the milling of any material. A simple change in Carbide blade grade only is necessary. Fig. 10 presents an 8" diameter face mill taking a cut in Dural, one of the aluminum copper alloys. And Fig. 11 shows the same cutter body for the milling of a magnesium alloy at 6,000 rpm, 12,600 surface feet per minute and at 300 inches per minute table feed.

## SPECIAL DRILLING MACHINE

The accompanying illustration shows a set-up for drilling, etching, and cleaning a small Cast Iron automotive part. The parts are loaded on an automatic rotary index table and drilled in the first position using Simplex Automatic Drilling Units. In the second position the parts are etched by an air operated broaching fixture. In the final position they are



cleaned by brushes operating from air motors, and automatically ejected. The manufacturer claims that this machine is capable of a production of 3000 pcs. per hour. The Simplex Automatic Drilling Units shown are made in progressive sizes for drills from No. 54 to  $\frac{1}{4}''$  dia. An illustrated folder fully describing these units will be sent on request by the Simplex Tool Engineering Co., 2540 Park Ave., Detroit 1, Mich.

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KEY	MACHINE & TYPE	SIZE OR CAPACITY
1	Honing, internal, horizontal type	Under 6" Bore
2	Lapping, flat surface	24" diam. lap plate
3	Lapping, gear tooth, external	
4	Lapping, gear tooth, external and internal	
5	Honing, internal, vertical	



<sup>1</sup>All items shown here and on the following three pages are offered subject to prior sale. This surplus property has previously been advertised and offered to prior claimants including Veterans of World War II.

## MAIL TODAY\*

To War Assets Administration:

Please send me information on the types of Finishing Tools checked below:

Name..... Tel. No. ....

Firm.....

Address.....

City..... State.....

\*For War Assets Administration address, see 4th page of this advertisement.

## CHECK LIST

(These key numbers correspond to the machines listed in Special Buys! Simply check those in which you are interested.)

3.....

1..... 4.....

2..... 5.....

277-6

Lapping Machine, flat-surface type 24" diameter lap plate. 1000 rpm. 1000 lbs. weight. This model are available for purchase at the Detroit, St. Louis, Chicago and Boston, W.A.A. Regional Offices.



Honing Machine, internal type, horizontal design. Size of bore, under 6" diameter. 1000 rpm. 1000 lbs. weight. This one is located at warehouses in Detroit, Cleveland, Chicago and Boston. Other types and sizes, etc. in stock are in other W.A.A. Offices.



# MODERN TOOLS

## *Speed Production*

**AVAILABLE NOW FROM GOVERNMENT-OWNED SURPLUS**

**American Industry is faced by its greatest production problem—that of supplying many millions of people all over the world with all the long-awaited items of comfortable peaceful living. In its prompt solution lies an important profit opportunity for individual industries.**

Administration is telling as large a portion of industry as possible, what kinds and quantities of machine tools are available. If you are interested, other buying information will be made available quickly. Look over the listing at right carefully. Decide which of these basic tools will help you solve immediate problems.

War Assets Administration is helping to meet this problem. We are making available to industry and business billions of dollars worth of government-owned war surpluses.

By means of this 4-page advertisement, War Assets

Administration is telling as large a portion of industry as possible, what kinds and quantities of machine tools are available. If you are interested, other buying information will be made available quickly. Look over the listing of right carefully. Decide which of these basic tools will help you solve immediate production problems. Then clip and mail the coupon to the nearest W.A.A. office listed at the bottom of the next page. Or if you prefer—phone your Regional Office today, and arrange a visit to inspect the equipment you want to buy.

**EXPEDITING COUPON**

### **Free Information**

**Check and Mail Today!**

### To War Assets Administration<sup>1</sup>:

Please send me specifications, prices and other information on the items listed at right.

(To save writing simply use the key numbers shown in the left-hand column of the list on opposite page.)

Name: .....

Firm, ..... Tel. No. ....

**Address:**.....

..... State.....

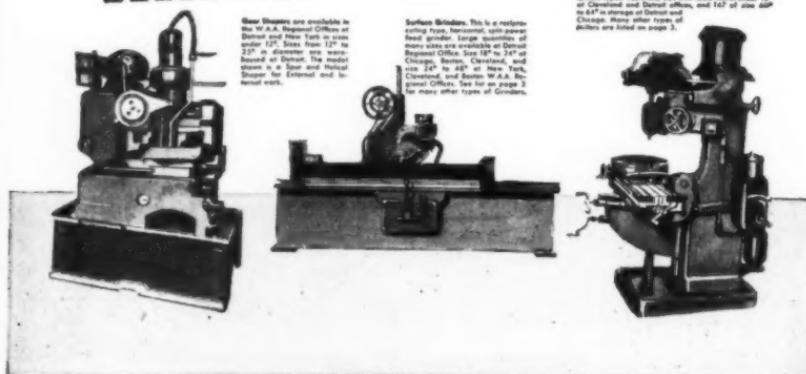
Please write address on 4th page of this advertisement.

\*See W&A ad on the 4th page of this advertisement.

\*See page 46 of this advertisement.

377-4

Standard Miller, typical of a large number of vertical spindle types. You'll find 281 with table travel under 12" at Cleveland and Detroit offices, and 167 of one size M-16 to 64" in storage at Detroit and Chicago. Many other types of millers are listed on page 3.



**Gear Shears** are available in the W.A.A. Regional Offices of Detroit and New York in sizes under 12". Sizes from 12" to 25" in diameter are manufactured at Detroit. The model shown is a Spur and Helical Shear for External and Internal work.

**Surface Grinders.** This is a non-sparking type, horizontal, split-power feed grinder. Large capacities of many sizes are available at Denver Regional Office. Size 18" to 24" at Chicago, Boston, Cleveland, and size 24" to 48" at New York, Cleveland, and Boston W.A.R. Regional Offices. See list on page 3 for many other types of Grinders.

to 6-1/2" in storage at Detroit and Chicago. Many other types of pullers are listed on page 3.

## CHECK LIST OF SPECIAL MACHINE TOOL BUYS!

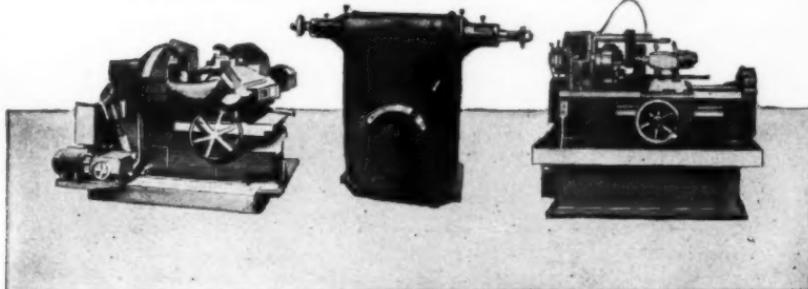
Here are a few of the many hundreds of machine tools available to you through War Assets Administration.

REF	MACHINE	TYPE	SIZE OR CAPACITY	REF	MACHINE	TYPE	SIZE OR CAPACITY
1	Swing, Drilling & Milling	Horizontal	Up to 10"	27	Miller	Horizontal	10" and Over Twin Travel
2	Swing & Turning Mills	Vertical	24" to 130" Swing	28	Miller	Planer	All sizes
3	Swing & Turning Fixed Bed Mills	Vertical	Under 10" to 14"	29	Miller	Knee Type	All sizes
4	Precision Boring Machines	Horizontal	Under 8" to 10"	30	Miller	Vertical—with Sliding Universal Heads	All sizes
5		Vertical	Under 10" to 14"	31	Miller	Automatic	All sizes
6	Drills	Horizontal	Under 10" Cap. Horizontal—single double and multiple heads	32	Miller	Bed Type—Single Spindle	All sizes
7		Vertical	Under 15" Cap. Up to 22" Swing	33	Miller	Vertical Fixed Bed Planer (1 1/2 & 2 Spindles)	10" to 14" Cap.
8		Horizontal	10" to 17" Cap. 10" to 24" Swing	34	Miller	Vertical—Single Spindle	10" and over Workpiece
9	Standard Bench	Horizontal	Under 10" Cap. Up to 12" Swing	35	Miller	Horizontal— Twin Travel	Up to 10" Cap.
10	Standard Bench	Vertical	Under 10" Cap. Up to 12" Swing	36	Miller	Horizontal— Twin Travel— Checkers	Up to 10" Cap.
11		Horizontal	Under 15" Cap. 12" to 22" Swing	37	Miller	Planer	6" to Over 10" Workpiece
12		Vertical	10" to 17" Cap. Up to 22" Swing	38	Segregator	Horizontal	10 to 15 H.P.
13	Swing, Floor	Horizontal	10" to 14" Cap. 10" to 22" Swing	39	Segregator	Vertical	Up to 15 H.P.
14	Swing, Floor	Vertical	10" to 17" Cap. Up to 22" Swing	40	Planer & Surface	Horizontal	10 to 15 H.P.
15		Horizontal	Under 10" Cap. 12" to 22" Swing	41	Lathe	Vertical	Up to 15 H.P.
16		Vertical	Up to 10" Cap. Up to 22" Swing	42	Lathe	Horizontal	Up to 15 H.P.
17		Horizontal	Up to 10" Cap. Up to 22" Swing	43	Lathe	Vertical	Up to 15 H.P.
18		Vertical	Up to 10" Cap. Up to 22" Swing	44	Abrasives Machine	Horizontal	Under 10" Cap.
19	Multi-Tool	Horizontal	10" to 14" Cap. Up to 22" Swing	45	Abrasives Machine	Vertical	10 to 15 H.P.
20	Lathe	Horizontal	Up to 10" Cap. Up to 22" Swing	46	Lathe	Vertical	10 to 15 H.P.
21		Vertical	Up to 10" Cap. Up to 22" Swing	47	Horizontal	Horizontal	10 to 15 H.P.
22		Horizontal	Up to 10" Cap. Up to 22" Swing	48	Horizontal	Vertical	10 to 15 H.P.
23		Vertical	Up to 10" Cap. Up to 22" Swing	49	Horizontal	Vertical	10 to 15 H.P.
24		Horizontal	Up to 10" Cap. Up to 22" Swing	50	Horizontal	Horizontal	10 to 15 H.P.
25	Sheet Metal	Horizontal	All sizes	51	Horizontal	Vertical	10 to 15 H.P.
26		Vertical	Up to 11" Cap. 20" width	52	Horizontal	Vertical	10 to 15 H.P.
			15" and Over Cap.	53	Horizontal	Vertical	10 to 15 H.P.
				54	Horizontal	Vertical	10 to 15 H.P.
				55	Horizontal	Horizontal	10 to 15 H.P.
				56	Horizontal	Vertical	10 to 15 H.P.
				57	Horizontal	Vertical	10 to 15 H.P.
				58	Horizontal	Vertical	10 to 15 H.P.
				59	Horizontal	Vertical	10 to 15 H.P.
				60	Horizontal	Vertical	10 to 15 H.P.
				61	Horizontal	Vertical	10 to 15 H.P.
				62	Horizontal	Vertical	10 to 15 H.P.
				63	Horizontal	Vertical	10 to 15 H.P.

Steel Cutter Bore. Straight tooth generators (12" diam.) are now available in sizes from 10" to 14" and 15" to 20". Other sizes may be leased at W.A.A. Segregator Office in Detroit, Chicago and New York.

Polishing and Buffing Machines. The heavy duty floor type shown is available in larger sizes. 100 machines are available from 10" to 15" H.P. in Cleveland; 100 machines 1 1/2" to 2 1/2" diam. and 100 machines 2 1/2" to 3 1/2" diam. are available in Detroit and Buffalo and 422 machines, 5 to 10 H.P. or larger, in Chicago, Cleveland, Chicago and Buffalo.

Universal Thread Mill. The automatic thread mill is one of the many tools and machines now available for purchase at W.A.A. Segregator Office in Detroit, Chicago, Buffalo, Cleveland. Check local office for detailed information on other types of mining tools.



## FREE INFORMATION

To War Assets Administration:

Without obligation please send me detailed information on the following machine tools:

Name.....

Address.....

City..... State.....

Firm.....

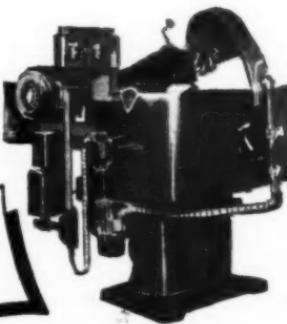
Address.....

City..... State.....

Phone.....

## ABRASIVE CUT-OFF

Abrasives Cut-off Machines. For this and all other machine tools shown on these four pages, simply circle the number of the Regional Office to the left. Each of these offices can give you information about present inventories of machine tools . . . of know value and the coupons of left. 112 abrasive cut-off machines are available new and more will be disposed surplus.



## GOVERNMENT-OWNED SURPLUS PRODUCTION EQUIPMENT



The machine tools shown on this and the preceding three pages, produced a steady flow of equipment during the war. Now that their job is done they are ready for application to civilian production needs. Huge quantities of all models and types are available—so many that they simply couldn't be completely listed on these few pages. For you these machines spell opportunity to reequip your plant for postwar markets quickly and at low cost. Certainly it costs little to investigate. Simply circle the item or items listed on this and preceding pages—clip out the coupons and mail today.

### TAPPING MACHINES

Tapping Machines. Over 400 of the one spindle, vertical type are waiting for purchase in Detroit, Chicago, Boston and Philadelphia warehouses. Two spindle models, (not shown) may be inspected at warehouses of either the Cleveland or Boston W.A.A. Regional Offices. 259 horizontal one spindle machines are being sold at Birming-  
ham, Detroit, Cleveland, Chicago, and Philadelphia Regional Offices.

## WAR ASSETS ADMINISTRATION

Offices located at: Atlanta • Birmingham • Boston • Charlotte • Chicago • Cincinnati • Cleveland • Dallas  
Denver • Detroit • Fort Worth • Helena • Houston • Jacksonville • Kansas City, Mo. • Little Rock • Los Angeles  
Louisville • Minneapolis • Nashville • New Orleans • New York • Oklahoma City • Omaha • Philadelphia  
Portland, Ore. • Richmond • St. Louis • Salt Lake City • San Antonio • San Francisco • Seattle • Spokane

# De-Burring with Power Brushing Machines

THE installation of rotary-table-type, automatic power brushing machines for the brushing of gears to remove burrs and to round edges of gear teeth, has increased the efficiency of these operations appreciably, according to Osborn officials.

These machines, company officials point out, eliminate the necessity for great dexterity on the part of the operator necessary where portable, high-speed tools have been used.

When gear teeth are brushed with the portable tools equipped with mounted abrasive points, noticeable variations between teeth often occur and a moment's carelessness on the part of the operator—can easily ruin a costly gear by grinding too deep.

Time saving by the use of the table-type machines varies with the size and complexity of the part being finished. However, in the case of the operation illustrated in Figs. 1 and 2, the equipment completed the brushing operation in less than three minutes, whereas a former hand method required 150 minutes.

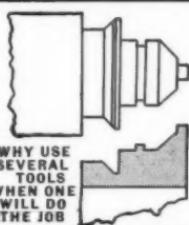
Stress concentration in many instances seems to be caused by sharp edges or burrs, or at least is accompanied by them. These may enlarge or start small microscopic cracks until, as

the stress is repeated, the whole member ruptures.



Fig. 1—A rotary, table-type, automatic brushing machine used for brushing gears to remove burrs and round edges of gear teeth.

In numerous operations the Fascut brush is reported to have proven a practical and economical solution to



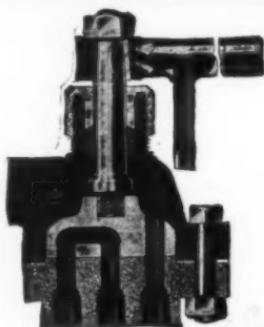
79 NEWBRIDGE ROAD

## FORM GROUND CARBIDE AND HIGH SPEED TOOL BITS

TERRITORIES OPEN FOR LIVE REPRESENTATIVES

NEW MILFORD CARBIDE TOOL CO., INC.

NEW MILFORD, N. J.



## NICHOLSON VALVES

→ *Custom  
Constructed*

TO  
DO SPECIFIC CONTROL  
JOBS BETTER, LONGER

Nicholson Control Valves are assembled from a choice of six different combinations of metals for body, seat, disc and stem, to suit your specific pressures and mediums . . . one reason why Nicholson Valves are today's "stand-outs" for efficiency and durability. For air, gas, steam, water, oil and other liquids. Pressures to 500 lbs.

Catalog 543 or See Sweet's

W. H. NICHOLSON & CO.  
117 Oregon St., Wilkes-Barre, Pa.

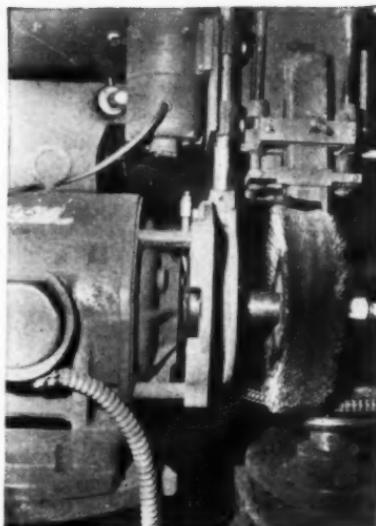


Fig. 2—A close-up of the automatic gear brushing machine which removes burrs and avoids costly gear-grinding mistakes.

stress relieving for either large or small lot production runs, Osborn officials declare. They are producing surfaces having a roughness of only 8 micro inches R. M. S.

Figs. 3 and 4 depict before and after illustrations of a 1½" diameter steel spur gear operation. The comparison of these two photographs shows that all small burrs were removed and the corners uniformly rounded. Before brushes were used to finish the gear, six minutes were required. The brushing

For  
Fast, Accurate  
Metal-Cutting  
Use

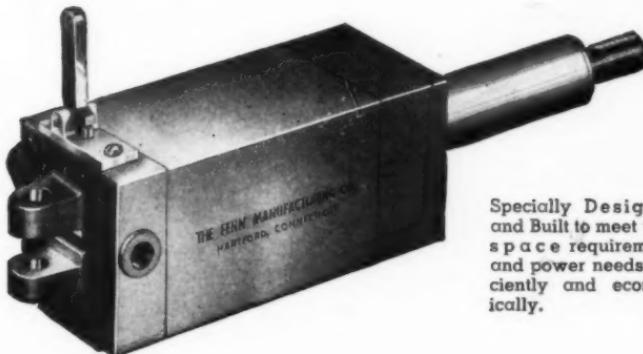
**KENNAMETAL** CEMENTED  
CARBIDE  
TOOLS, BLANKS, and MILLING CUTTERS

**KENNAMETAL Inc.**  
LATROBE, PA.

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# CUSTOM BUILT AIR CYLINDERS



Specially Designed  
and Built to meet your  
space requirements  
and power needs effi-  
ciently and econom-  
ically.

FENN Custom-Built Air Cylinders eliminate completely the necessity of fitting your designs to standard type cylinders, particularly where space is at a premium. By adopting Fenn Cylinders you may reduce your space requirements for the same power at the same available pressure because Fenn builds them specially to meet the requisites of your designs.

Complete cylinder valve can be furnished as a separate item or as an integral part of the cylinder.

Built to provide accurate control of the piston velocity curve according to your needs, all Fenn Cylinders can be cushioned at either or both ends of the stroke.

Orders accepted in any quantity. Prices only a fraction more than standard cylinders. Inquiries invited regarding your specific problems.

*The* **FENN** *Manufacturing*  
*Company*

HARTFORD • CONNECTICUT  
Dept. G

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## THREAD-ALL Tapper



### PRECISION TAPPING !! LICKED !!

By Converting Any Drill Press into  
a Precision Tapping Machine.

Check these advantages:

Handles small taps without fear of  
breakage. Takes sizes up to 1 1/2"  
with ease.

Gives precision tapping without need  
of lead screws.

Electro-magnetically controlled positive  
depth setting.

No adjustments required for tap  
sizes.

Silent forward and automatic high  
speed reverse action.

Taps right or left hand without ad-  
justment.

Machine may be used for drilling,  
reaming, counterboring, etc. without  
adjustment.

Write for full details.

**GRUEN GAUGE CO.**  
10039 Marcus Ave. Detroit, Mich.

method finished the gear in 20 seconds  
with much more uniform results.

The Fascut brushes are particularly  
adaptable to gears, linkage, threads and  
many similar parts. They not only re-  
move sharp edges and burrs but usual-  
ly improve the finish of adjacent sur-  
faces. They are being used with equal  
success on steel and non-ferrous metals  
as well as on high alloy steels, both

Fig. 3 (Top)—Photomicrograph of 1-1/2  
inch diameter steel spur gear before  
brushing.

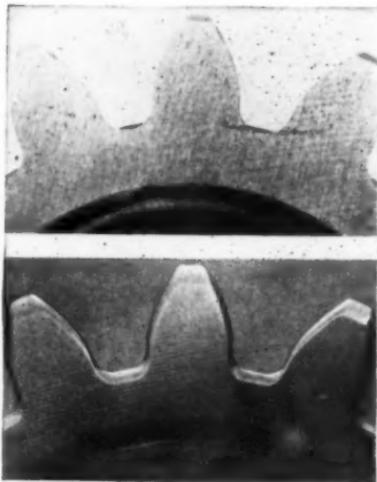


Fig. 4 (Below)—Photomicrograph of steel  
spur gear after brushing, showing how  
tool marks are blended into polished  
surface.

hardened and unhardened. The Cord  
brushes are used where larger radii are  
required or on softer metals when truer  
radii are needed.

Stress reducing applications, together  
with many other power brushing tech-  
niques in the metal finishing field, are  
included in a new 24-page booklet on  
"How To Select Power Brushes for  
Manufacturing Operations" recently  
published by The Osborn Mfg. Co., 5401  
Hamilton Ave., Cleveland 14, O.

# SPECIAL "NEGATIVE RAKE" MILLERS FOR MACHINING STEEL AT HIGH SPEEDS

OK Negative Rake and Spiral Milling Cutters take a "shearing" cut from rear of blade to point, leaving a high finish on steel. This often saves the cost and time of an extra operation.

Tools of this character must be made of the very best material and must have extreme ruggedness embodied in the design. As great strength and rigidity are inbuilt in all OK Milling Cutters, they are a natural "parent" for the basis of negative rake millers.

OK Milling Cutters — also OK Single-Point Tools for lathes, shapers and planers—are available in a wide variety of types and sizes. If you have a need in your production for better metal cutting tools, investigate the OK System. Glad to make recommendations if you will describe your problem.



INSERTED-BLADE METAL CUTTING

## TOOL SYSTEM

MANUFACTURED ONLY BY THE OK TOOL COMPANY, SHELTON, CONN., U.S.A.

3 NEW  
*Featherweight*  
**KIPP**  
**AIR GRINDERS**

**MODEL JA**

(Turbine Type Tool)—  
 Takes Wheels Up To  
 $\frac{3}{4}$ ". Speed 5000 RPM,  
 Collet  $\frac{5}{8}$ ", Weight 12 oz.  
 Overall Length 6 $\frac{3}{4}$ "



**\$33.25**

**MODEL TT**

(Turbine Type Tool)—  
 Takes Wheels Up To  
 $1\frac{1}{2}$ ". Speed 30000 RPM,  
 Collet 15/64". Weight 2 lbs.  
 Overall Length 9"



**\$44.50**

**MODEL PVT**

(Vane Type Tool)—A  
 Power Tool For The  
 Heavier Jobs Taking  
 Wheels Up To  $2\frac{1}{2}$ ".  
 Speed 10000 RPM, Collet  
 $15/64$ ", Weight 2 lbs. 4  
 oz., Overall Length 9"



**\$55.50**

*Order Now!*

You now have your choice of three  
 Featherweight Kipp Air Grinders as  
 illustrated above. All three are avail-  
 able for immediate delivery and  
 priced extremely low. Madison-Kipp  
 carries a full line of Kipp grinder  
 wheels and accessories. Order today.

**MADISON-KIPP**  
 CORPORATION  
 207 Waubesa St., Madison 4, Wis.

**CARBIDE-TIPPED TOOLS**

Just off the press comes a new catalog by the Schmarje Tool and Engineering Co. Listed are standardized carbide-tipped reamers, spot facers, and counterbores. The 12-page catalog covers standardized design tools which cover 90% of the applications of high production carbide-tipped tools for finishing and spotting holes.

Also listed are services for the design and making of special form tools employing carbides.

**MILLING MACHINES**

Due to the present and ever-going interest in Carbide Milling, a new catalog on the subject should prove useful. It is catalog No. CSM-20, published by the Kearney & Trecker Corp., Milwaukee 14, Wis. The publication is 24 pages and is illustrated in color. Included are general specifications, plan dimensions, many helpful recommendations, and illustrations of some typical operations.

The title of the catalog is "20-30-50 CSM Knee Type Milling Machines." A complete range of sizes is covered in horizontal and vertical models. These machines have only recently been announced by the manufacturers.

Information is also included on the CSM cutter, which is a face cutter available in standard sizes ranging from 1" to 16" diameter.

**RESISTANCE WELDING**

A bulletin entitled "Basic types of Resistance Welders" has been made available by the Federal Machine and Welder Co., 216 Dana St., Warren, O. This covers machines for simple spot welding, seam welding, butt flash welding, etc.

A wide variety of machines are described including "gun" type welders, which are for hand use, truck mounted, or overhead rail. Others are heavy automatic bar and steel drum welders, aluminum welders, window sash welders, etc. .

A large number of operating and pressure systems are included, such as air and motor drive, hydraulic types, air toggle motors, gear driven, and others. Some of these welders employ electronic controls, particularly in the welding of aluminum.

This bulletin is also a reference for other publications which more fully describe any special type of machine.

# REQUIREMENTS FOR MACHINE TOOLS

By J. R. WEAVER\*

**T**ODAY, almost every manufacturer in the country is planning improvements in his standard line of goods, in designing new and better products for the future—and is looking for easier, quicker, and less expensive ways of making them. The machine tool industry must help.

It is a well known fact that our production efficiency during the war was about 60% as compared with pre-war standards. This was largely caused by the freezing of machine tools and manufacturing equipment, the introduction into industry of inexperienced help and older people, and the induction into the armed forces of so many young people. We are now in the position of trying to pick up this lost efficiency in as short a time as possible. This means, of course, that we must increase our productivity per man-hour, not just to the pre-war level, but to make up, so far as possible, for the failure to progress during the past five years.

During the war the machine tool industry performed miracles in production. This large production, however, was obtained to some extent at the expense of fundamental development. The government asked each machine tool manufacturer to produce as many machines as he could of a certain size and type. Consequently, the design and development of many new machine tools was impossible until after the emergency.

In spite of restrictions, the industry made notable strides in building special machines for producing parts with greater accuracy, fewer operations, greater speeds, and lower overhead costs. However, the machine tool builders now have an obligation that they must meet if they are to maintain their position in the economic picture. They must bring about better, higher pro-

duction machines. Industry will not buy new machine tools just as the public buys new automobiles. New machine tools must justify themselves in actual savings, and this can only be done by producing more and better products. This need is emphasized by the present trend toward increased wages.

Furthermore, with the increased demand for production there will be a lack of skilled help. Therefore, machine tools must be developed that will produce higher quality and higher quantity with unskilled or semi-skilled operators. This, of course, demands machines that require operators with the least amount of training.

The machine tool industry also should interest itself in familiarizing our young people with the machine tool trade. Four or five years ago I presented to the Pittsburgh Schools a suggestion that more training be done in high schools on machine tool operation. At that time I found that only 15% of high school graduates entered college. The other 85% obtained a job after graduating. These 85% lacked any kind of basic knowledge that would fit them for jobs in industry. It seems to me that the machine tool industry could sponsor some kind of a training program so that high school graduates who do not intend to go to college could at least get a basic understanding of machine tools. Incidentally, this type of training program could undoubtedly absorb most of the surplus machine tools in existence throughout the country at the present time.

In addition, the industry should give more attention to cutting tools, jigs, and fixtures. After all, these really deter-

\*Mr. Weaver is Manager of the East Springfield Works Electric Appliance Div., Westinghouse Electric Corp., East Springfield, Mass.

mine the productivity of the machine. Often times this phase of the entire problem is left to the user, and in many cases, he is not as well versed in this subject as the machine tool manufacturer. Some of this was done prior to the war by certain companies which toolled up production machines in their entirety. However, this effort was concentrated too much in mass production lines and was not sufficiently tried in jobbing shops or other similar manufacturing operations.

The Westinghouse Electric Corporation is a company that is going to need large numbers of machine tools in the future. We make a variety of products ranging from mass production items, such as fans and refrigerators, to tailor-made items such as large turbines and generators. This, naturally, necessitates using all the different kinds of machines now being manufactured, from the special single purpose machines for mass production to the general purpose machine tool for tailor-made products. You can readily appreciate that our purchasing will be large for a long

time since we intend to maintain our position in our particular fields.

It is rather difficult to tell you how to design or manufacture these machines. However, many new requirements will have to be taken into consideration, and I'm going to challenge you to do some thinking on ten of these:

#### Size of Machines

Space is going to be an important factor in production. We are building more and larger factories, but it is economical to hold space to a minimum. Therefore, tools should be made as compact as possible.

#### Ease of Operation of Machines

Machines that require operators with the least amount of skill should be made. This is true from a simple drill press to a complicated automatic machine. Need for simpler operations is being brought about because labor's drive is to increase the wages of the lower priced operator in greater proportion to the skilled mechanic. Therefore, the inclination to learn a trade is becoming less and less. The machine

# FEWER REJECTS

*with the precision of this*  
**AUTOMATIC STAKER**

Speed and accuracy are built into the Automatic Staking Machine to make it outperform conventional riveters on countless jobs. Its trouble-free, faster operation speeds production, reduces rejects and costs. Uniform hammer blow is easily adjusted to all kinds of staking.

	Model 1	Model 1-B	Model 2
Stroke	2"	2"	2 1/2"
Spindle	1"	1"	1 1/4"
Throat Depth	4 3/4"	4 3/4"	8 1/2"

**WEBER MACHINE CORP.**  
59 RUTTER ST. ROCHESTER 6, N. Y.



Distributors: Some territories are still open, offering substantial profit possibilities. Write regarding yours.

tool must supply the skill formerly possessed by the man.

#### Maintenance of the Machine

For the same reason maintenance of the machine must be kept to a minimum. Repairs should be made in the simplest way. Possibly instead of repairing machines, it will be necessary to design them so that worn parts can be easily replaced by new parts from the factory.

#### Electrical Developments

Electricity will continue to play a very important part in the operation of machine tools. Developments along this line might be made in motors or control applications to reduce hand operations even further.

#### More Accurate Machines

Another feature of increasing importance which should be considered is that better faster, and more accurate means of inspection and measuring work that are being developed and perfected. While the record of accuracy accomplishments in the machine tool field is remarkable, effort for still more

accuracy must not be relaxed. As a manufacturer who uses a large number of machine tools, it is my experience that the best quality and lowest cost production is obtained by making all the parts to very close, and ever closer tolerances. Any reduction in tolerances inevitably results in faster and surer assembly and a better product, and usually results in better overall economy.

Take, as an example, the manufacture of refrigeration compressors. A piston and cylinder mechanism are utilized to pump refrigerant. The piston has no rings. To obtain a mechanism which is quiet, efficient, and trouble-free, the difference in the diameter of the piston and the cylinder must be held to a nominal .0005 inch. To achieve this fit, selective assembly is needed. Pistons and cylinders are accurately measured, marked with an electric pencil and matched into 16 groups.

It is apparent that more accurate manufacturing of these parts would cut

## *The Du Bois Verti-Zontal Rotary Table*



Available in 11" size for immediate delivery.

Other sizes—delivery upon request.

Some territories open for Dealers.

A Rotary Table with both Vertical and Horizontal bases. The table can be set in a vertical or horizontal plane. When in a vertical position, the face of the table can be set at any angle with respect to the cutting tools.

DESIGNED FOR ACCURACY, FLEXIBILITY, AND RIGIDITY.

Fine workmanship, high grade materials, and expert engineering are built into each unit. An **internal expanding bronze clamp ring** that locks the Table is **only one** of the features that cannot be found in any other table.

A versatile tool for every tool room or shop!

Write for details and specifications

**Industrial Equipment Co.**

P. O. Box 721

Tulsa 1, Oklahoma

# Janette *Speed* REDUCERS

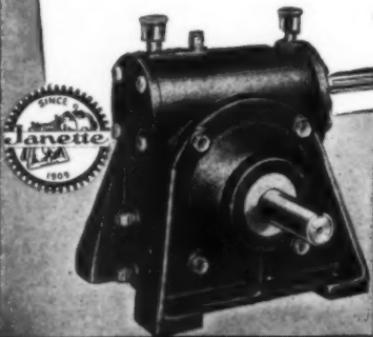
## For SLOW SPEED DRIVES

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For over 36 years Janette has been building high quality machinery under the guidance of the founder of the company. We are small enough to be flexible and are able to take a personal interest in the individual requirements of our customers.

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Janette Manufacturing Company  
556 W. Monroe St. Chicago 6, Ill.

costs tremendously, save rejects, and produce a more efficient machine. If parts could be easily measured to a millionth of an inch, machine tool builders would be expected to produce machines accurate to a millionth of an inch.

### Construction of Machines

It is probable that closer tolerances will require increased attention to stiffer, more rigid construction. Even more sturdy construction may be necessary to withstand greater forces for faster removal of material.

### Control of Thermal Expansion

Another point that it may be necessary to consider is the use of construction materials equivalent to "Invar" with near zero temperature coefficients of expansion to eliminate inaccuracies in operation due to over-heating of machine sections.

This feature would increase available productive hours of a tool by eliminating warming up time and the necessity for resetting tools near the start of the run. It would also reduce scrap losses and permit more efficient operation with less skilled workmen.

At our East Springfield Works we are now trying to solve a production problem involving thermal expansion in producing refrigerator compressor crank shafts. Due to temperature changes in the machine used to grind the bearing surface on this shaft, the machine dimensions change and we have never been able to make our loading on this operation. Various methods of solving this problem are now being studied—including the use of "Invar" and the refrigeration of some of the parts of the machine.

### Reducing "Set-up" Time

Another desirable objective in machine tool design is to develop features to pre-set cutting tools to give finished tolerances on a piece without so much "cut and try", and to develop features of expeditious gaging and measuring the machine surfaces produced so that when the operation is completed, it will be certain to be correct.

### More Special Purpose Tools

Another suggestion is the possibility for still further development of special purpose tools in place of multi-purpose

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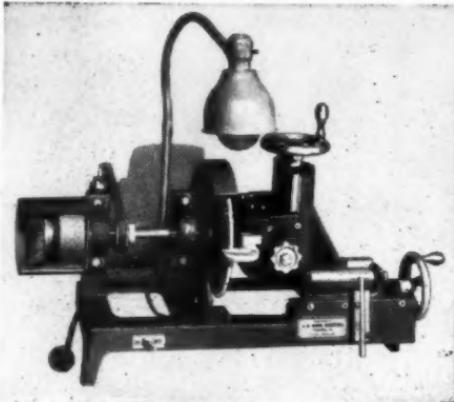
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tools by elimination of adjustments and adaptations not necessary for the specific job. In the past, machine tools have been capable of accommodating a wide range of sizes of work and have built into them facilities and features for doing a thousand and one operations. Rarely does a manufacturer of mass production items make use of more than a few of these facilities.

Better bearings, protection of bearings, automatic lubrication, and good use of coolants is being accomplished and you men are to be commended for the progress you have made on these problems.

### **Dream Tool of Tomorrow**

In their laboratories, our engineers are already working on new designs which will eventually make today's appliances obsolete. To build these products, we will need a new type of a machine as much better than today's highly efficient models as the electric light is better than the old-fashioned tallow candle. None of us dare be complacent or satisfied with today's achievements. We must constantly seek new and better products, cheaper and more efficient methods of manufacture.

You ask what kind of a machine tool will we need to build these new products.

I believe we must aim toward eventually performing all the operations on a piece with one machine. A machine to do this will combine many dissimilar operations and probably be relatively smaller in size and yet be sufficiently flexible to take care of periodic changes in design of product. When necessary to change the hold of a piece to complete the operation, positive and automatic transfer means must be devised.

Let me illustrate the importance of this feature by a very simple example.

Here is a part of the Bug Bomb Aerosol Dispenser; almost 30,000,000 of these bombs were made during the war for the armed forces. To produce this piece, five separate machines are necessary—punching, drawing, trimming, embossing, and piercing. Naturally, parts must be conveyed between machines for each of these operations.

If we could do this job on one machine we could save floor space, trans-

portation, operators, and man hours. The steel could come in on a spool at one end—finished pieces would come out into a hopper at the other end.

We have hundreds of problems like this—problems that must be solved because of the many new economic pressures I have outlined to you. You are the men to solve these problems and I have confidence that you will accept the challenge and find the answers just as you found the answers for the tremendous problems of war-time production.

You men have maintained large engineering staffs during the war to work out the complicated riddles of producing machines for destruction. Now in the days of peace you need even more the services of a skilled imaginative staff of engineers to design more efficient, highly specialized machines for the mass production factories. Our engineers will work with you in solving our mutual problems, but we do not have the skill to design the tools. We do not know the limitations and possibilities of your machines, and we do not have enough of this work to justify a specialized engineering staff to learn it.

The machine tool industry has a bright future. However, it will only be as bright as the effort that the machine tool industry puts into its development and in selling it to the coming generation. Now is the time to plan for tomorrow.

## ASK YOURSELF:

What technical improvement in

methods, developed in war work, have we adapted to our peacetime operations?

What equipment should we scrap or replace to improve efficiency at lower costs?

What buildings will it be advisable for us to tear down, replace or repair?

Have any new or low cost materials been developed through war time research or usage which might be suitable for our peacetime products? If so, what advantages do they offer?

**EXACTLY to your specifications means**

***Abart* PRECISION**

IN

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BEVEL

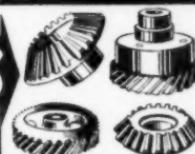
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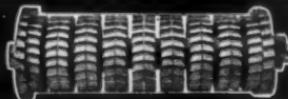
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# WHAT'S NEW IN METALWORKING

## GISHOLT TWO ELEMENT UNBALANCE MEASURING AND CORRECTING EQUIPMENT

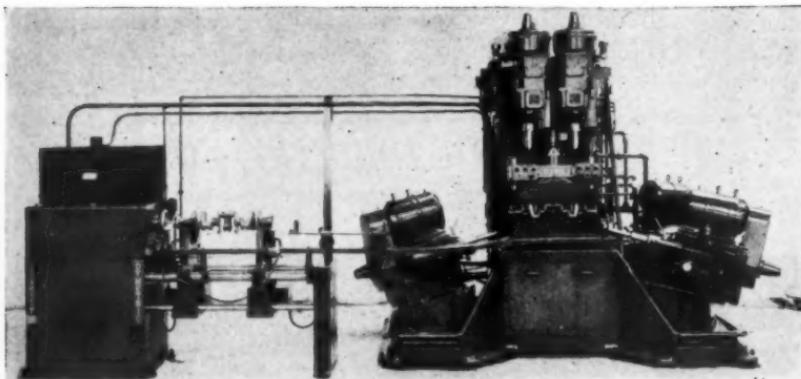
**C**OMPLETE, semi-automatic equipment for measuring and correcting unbalance in automotive type crankshafts has been developed by Gisholt Machine Co., 1185 E. Washington Ave., Madison 3, Wis. The equipment consists of two electrically connected machines. First of these machines is a Gisholt Type C Dynetric Balancing Machine. The second is a multiple spindle drilling machine.

Balancing is a process in which the distribution of mass in a rotating part is altered to eliminate vibrations at the bearings supporting the rotating part. This new equipment provides a means whereby the entire balancing

process can be completed on automotive crankshafts with a minimum of physical and mental effort, to a high degree of accuracy, and with a minimum possibility of human errors affecting results.

It is common practice to balance a rotating part by adding or removing weight in each of two planes perpendicular to the rotational axis. On a d-c armature, the banding wires provide two such planes where solder may be added to provide the necessary corrections for balance. On a squirrel cage fan, the shroud rings provide two planes of correction which are perpendicular to the rotational axis. In each

Here is the New Gisholt Two-Element Unbalanced Measuring and Correcting Equipment. It provides a means whereby the entire balancing process on automotive crank shafts can be completed with minimum physical and mental effort and with maximum accuracy.





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*Have you seen the new SHELDON Lathes . . .*

. . . those built in the new SHELDON machine tool plant? Always good lathes, these new SHELDONS are even better, not only in design refinements but in extreme accuracy, greater work capacity for size, "sweeter" handling and actual beauty of finish. Only a set-up like the new SHELDON plant could build such lathes—a specially designed building, the most modern manufacturing methods, complete tooling with row on row of the finest, most modern manufacturing equipment.

Make it a point to stop in at your SHELDON dealer's and see these new machine tools. Note their moderate prices. They are a revelation of what modern equipment and methods produce.

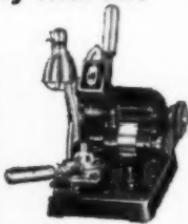
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Fixture Set-Ups  
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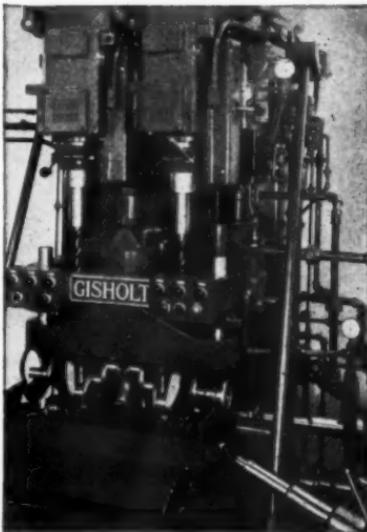
It's a high-speed, motor-driven unit that has many uses in finishing operations for light cuts on aluminum, brass, steel and other metals . . . also, rounding and burring steel and cast iron. Inexperienced operators quickly learn to use it with speed and precision.

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Close-up of drilling portion of Balancer.

of the examples here given, corrections for balance may be made in each of the planes thru 360° of arc. In crankshafts, it is generally impossible to find two planes of correction which are perpendicular to the rotational axis where balancing corrections can be made thru 360°. Actually, only a few points are available on a crankshaft where metal may be removed to give balance. Common correction points in a crankshaft are in the crankpins and in the counterweights.

Generally, the machines available for measuring unbalance effects in crankshafts are of a universal nature which provide for measurement of the amount and angular location of unbalance in each of two planes perpendicular to the rotational axis. By use of charts, or by trial and error methods, the balancing machine operator determines the

amount of metal which should be removed from the permissible correction points in a crankshaft. The operator marks on crankshaft the amount and position of the drilling corrections which should be applied to give balance to the shaft. The marked crankshaft is then passed on to a drilling machine operator for correction.

The Type C Machine is arranged to indicate directly the amount of metal which should be removed from specific points in a crankshaft in order to produce balance. Points for unbalance correction are determined only by limitations of the crankshaft. For example, in a four bearing six throw crankshaft, corrections for balance may be made by drilling into Nos. 1, 2, 5 and 6 crankpins and into the kidney cheek between Nos. 1 and 2 crankpins and between Nos. 5 and 6 crankpins. The balancing corrections in the kidney cheek are in the radial direction of Nos. 3 and 4

crankpins. With such an arrangement of correction drilling, there are, on each end of the crankshaft, three points spaced 120° apart where it is possible to drill for balance. To actually obtain combined static and dynamic balance of any crankshaft, actually it is only necessary to drill two of the three holes in each end of the crankshaft.

The Type C can be arranged to measure the exact amount of correction which should be applied at each of the six points, to give both static and dynamic balance. These six balancing machine indications are electrically transmitted to a six spindle drilling machine. In this drilling machine, the spindles are arranged so that holes can be drilled at the permissible points of correction. The depth of each hole is automatically set from the corresponding balancing machine measurement.

First step in the balancing process, is to load the crankshaft into the balancing machine from the production line.

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By movement of a lever, the crankshaft is hydraulically lowered into position on the vibratory supports of the balancing machine. The operator attaches the balancing machine driver to the crankshaft and presses start button of the balancing machine. The operator is then ready to measure the amount of correction to be applied at each of the six permissible points.

The balancing machine controls comprise a pair of selector switches and six weighing dials which are numbered to correspond with the correction points on the crankshaft. The selector switches and weighing dials are turned in sequence to cause a meter on the balancing machine to read zero. When the last weighing dial has been turned, driving coupling is removed from crankshaft. Crankshaft is then raised hydraulically so that operator can easily slide crankshaft onto a dolly. It should be noted here, that hydraulic lift cannot function unless driving coupling is removed from crankshaft. Crankshaft can be moved onto the dolly only when its angular position is such as will later permit it to be moved into the driller without difficulty. When dolly is loaded, dolly is unlatched and moved on to the correction drilling machine. By use of this dolly, operator is required to do much less lifting than is required in previous balancing processes.

When dolly has arrived at drilling machine, the crankshaft is in proper

angular position to be moved directly into driller. Crankshaft can enter drilling fixture in only one angular position so that it is positioned properly for correction drilling.

Correction drilling cycle is started by simultaneously pushing two start buttons, one with each hand. The drilling cycle actually includes:

- 1—Properly locating crankshaft in an end-wise position by hydraulic means;
- 2—Firmly supporting and clamping the crankshaft in the fixture;
- 3—Bringing up hydraulically operated wedges against the rough forged surfaces of crankshaft to provide support against drill thrust;
- 4—Starting drills traversing toward crankshaft and simultaneously initiating flow of coolant over drills;
- 5—Causing each of the drills to drop into feed when drills are approximately  $1/8$ " from surface from which metal is to be removed;
- 6—Initiating depth measurement of each drill separately, as drill contacts the crankshaft;
- 7—Back traversing each drill separately, when that drill has removed an amount of metal corresponding to the balancing machine measurement, and
- 8—Unclamping crankshaft and returning it to a position from which it may be easily returned to production line.

In this production process balancing machine indications are transferred to drilling machine by means of self-synchronous transmitters and self-synchronous receivers. Attached to each of the six weighing dials on balancing machine is a self-synchronous transmitter. Rotor of this transmitter is turned with the dial. Each transmitter is electrically connected to a receiver on a drill spindle.

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Balancing machine weighing dials actually measure unbalance effects in terms of ounce-inches, the product of weight of metal to be removed (ounces) times the radius at which metal is to be removed (inches). Because the drill spindles are arranged to drill at specific points in the crankshaft, radius of correction is established. Therefore, motion of the self-synchronous receiver is actually a measure of weight (ounces) to be removed by the drill with which the receiver is associated. The receiver carries a cam by means of which the uniform ounce-inch units of the balancing machine are converted into inches of depth of drilled hole. A given depth of a fixed diameter of drill removes a known weight of metal (ounces).

When traverse motion of drills is initiated, a depth gauge contracts cam on receiver and so gets depth measurement required for the drilled hole.

This depth measurement is not actually used until drill makes contact with crankshaft. The drill will repeatedly produce holes to the same depth, for the same receiver setting, to an accuracy of .003"; this represents a correction error of less than .05 ounce-inches. Drilling unit and depth control were made by the Leland-Gifford Co., Worcester, Mass. Drill units are their No. 4 self-contained, hydraulically fed units. Correction drills used on the Plymouth crankshaft are  $1\frac{1}{8}$ " diameter for drilling into Nos. 1, 2, 5 and 6 crankpins and one inch diameter for drilling into kidney cheeks.

Three seconds after drilling cycle is started, the receiver information has been transferred to its drill spindle so that weighing dials and transmitters on balancing machine can be reset without changing settings of correction drills. This makes it possible for a balancing machine operator to be determining amount of correction in a crankshaft while driller operator is correcting a shaft in which unbalance measurements have been previously determined. A green light on balancing machine advises operator when drilling machine has picked up information concerning the previously measured crankshaft.

During drilling operation, crankshaft is very firmly supported to prevent distortion. A crankshaft which is bent by the drilling operation will show as an unbalanced crankshaft when a check is made for balance. For this reason, points of support of the crankshaft in drilling fixture were carefully chosen so as to avoid distortion during the drilling operation. By use of hydraulically operated wedges, crankshaft is provided with firm support behind each drill.

Some drills on the correction machine cannot be seen by operator. For this reason, operator cannot be expected to determine when a drill has be-

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Vise No.	Width of Jaw, inches	Opens Inches	Weight Pounds
1D	$3\frac{1}{2}$	$3\frac{1}{2}$	$12\frac{1}{2}$
2D	5	$5\frac{1}{2}$	23

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1335 SO. MAIN ST.  
MEADVILLE, PENNSYLVANIA

come so dull as to require regrounding. On control panel, there is provided a numbered red light for each drill spindle. When any drill becomes dull, the red light associated with that drill spindle will be turned on by means of an hydraulic pressure switch. This light will stay on until drill has been changed and pressure switch manually reset.

Overall accuracy of the balancing process with the Gisholt Two Element Equipment on an average automotive crankshaft is 0.2 ounce-inch. This tolerance is made up of:

A tolerance of .05 ounce-inch due to the .003" tolerance in depth control;

A tolerance of .05 ounce-inch due to a .003" variation in diameter of hole as produced by a sharp and a dull drill and;

A tolerance of 0.1 ounce-inch due to small errors in the balancing machine, errors between the self-synchronous

transmitter and self-synchronous receiver, and the human errors in properly setting weighing dials to cause meter to read zero.

Production is largely determined by the time required for drilling the deepest correction hole. Where 1½" diameter correction drills are used, and where one of these drills may be required to drill a hole 1½" deep, cycle time on the driller including loading and unloading is 80 seconds. Such a correction in the crankpin of an average automotive crankshaft represents a compensation for 18 ounce-inches of unbalance which is an exceptionally large correction. It is quite probable that the average cycle time for the driller, including loading and unloading, will be 60 seconds.

The time required to obtain balancing machine indications is 25 seconds. Including loading and unloading, cycle time of the balancer is about 45 seconds. It is, therefore, evident that the process time on an average crankshaft is limited by the drilling cycle.

The machines and the crankshafts shown in the accompanying photographs are the property of the Plymouth Division of Chrysler Corp., Detroit.

#### GRINDING & LAPPING MACHINES

A catalog of the Norton Co., Worcester 6, Mass., has been published which presents in brief form the various types and purposes of their machines for grinding and lapping. Pictures are included of all machines along with their general specifications.

A few of the types presented are: cylindrical, car wheel, multipurpose, camshaft, lapping, and many others. More detailed information is available on all these types of machines from the Norton Company.

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NOTE: Special spindles are available to permit use of drills 1/8" to 3/8" diameter with corresponding minimum centers of 1/2" and 3/4".

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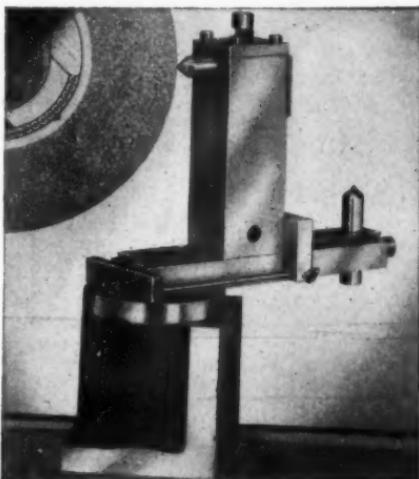
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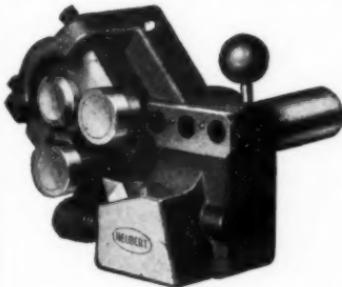
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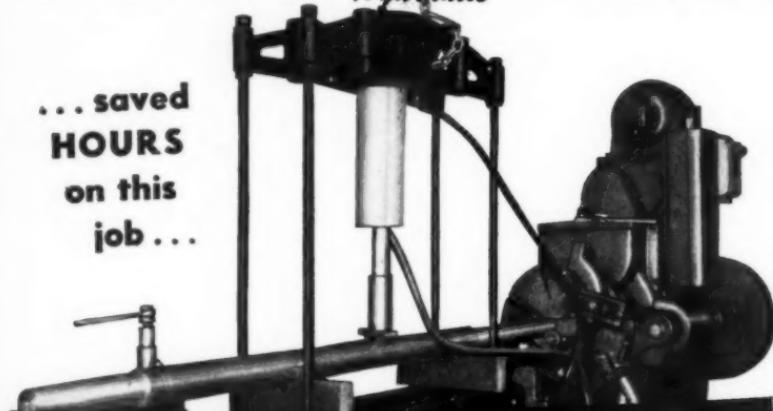
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A portable, all-around press of 1001 uses . . . that's a Rodgers. For example, here is how it saved hours of time and labor on the above job — straightening shafts:

The shafts were 92" long x 3 1/2" dia. and had to be perfectly straight for threading and finishing of ends. They were put on lathe centers, turned to establish the high spots and then placed between the V-blocks on the Rodgers Universal and pressed until the shaft was true. Then the V-blocks were removed, shaft placed on lathe centers again and finished.

The Rodgers Universal remained on the lathe bed while all of many shafts were finished — some of them 120" long x 5 1/2" dia.

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Portable Presses



## Venture Capital and Borrowed Capital

By ARTHUR ROBERTS

**V**ENTURE capital and borrowed capital will be needed in this post-war period for expansion, modernization and business promotion. The wise businessman never confuses them because overlapping may play havoc with profits. Venture capital pertains to investments in a business by outsiders, either thru the sale of securities or some sort of a partnership agreement. Here the investor does not lend his funds—he buys an equity in the business for a consideration.

Venture capital differs from bank loans or bond flotations. The latter must be repaid or the lender may levy. However, bank credit may be obtained to buy capital goods, such as machinery and business property. Years ago a businessman might acquire venture capital for expansion from private individuals but this source has run rather dry because of high income taxation. Such investors put their funds in government or other bonds today. To make

riskier investments and then pay heavy taxes on probable earnings gives too small a reward for the risks taken. Another source of venture capital is the security, but, generally speaking, only the large corporations can use it. The cost of security issues of less than \$250,000 runs around 10 per cent of the total, sometimes 25 per cent—about five times the cost of a large issue, and then, even if a small business concern successfully prepared an issue, paying the necessary charges, it may have tough sledding selling its stock.

That leaves the small businessman pretty well out on a limb in the procurement of outside venture capital, so he must expand on his own steam, so to speak. The ideal way is to build up a surplus thru profits so that you can under-write your own expansion, but few can do this, even where the surplus is substantial, because the excess of assets over liabilities, otherwise surplus, even in big companies is largely

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# LUMA

Combination  
Etchtool —  
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Tools  
in 1



Luma Marking and  
Demagnetizing SIMULTANEOUSLY

Writes on hardened steel — demagnetizes at the same time—with carbon point does light spot annealing and soldering jobs. Compact—easy to use—dependable.

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**Luma Electric Equipment Co.**  
Dept. H P. O. Box 132. Toledo 1, Ohio

a paper figure. To get cash, the management must apply outside for loans, presenting a satisfactory balance sheet as assurance that it can repay. If the assets seem liquid enough, the lender lends. The user of machine tools who wants to under-write his own expansion or postwar promotion program should set aside the actual cash in a sinking fund, but usually the acquisition of sufficient money takes too long. Precious time is lost because, in the interim, the user of machine tools could get his expansion program under way on borrowed funds and pay as he earned.

Altho venture capital and borrowed capital are two different things, loans are obtained to buy capital goods, but the user of machine tools should be careful to differentiate between loans for capital goods and loans for operating expense, or working capital, the former, long-term loans for more than a year; the latter, short-term loans for less than a year. It is less difficult for the smaller businessmen to get short-term loans.

Bank loans are secured by collateral or unsecured. The character loan is unsecured and the type short-term loan most desired by users of machine tools. If they have collateral, they are not receiving credit, merely exchanging one form of credit for another. Charges are usually lower on collateral loans. A character loan is based upon the general integrity and earning capacity of a businessman. To get one, a profit and loss statement and balance sheet are needed plus a good accounting system. Short-term loans cost about six per cent interest but the rate is secondary. It all depends upon how much you need the money and for what purpose. The yardstick is whether you can put the money to profitable use, make it earn more than you pay for it. If you can't, it doesn't pay to borrow.

Too many users of machine tools are backward about borrowing under all circumstances. Stingy credit practices are as bad as sub-normal advertising or hand-to-mouth buying. Big business uses plenty of fixed capital and operating money, must employ them to



LITTELL Air-Blast Valve automatically ejects pieces from punch presses. Keeps operator's hand out of danger zone. Increases safety and speed. Air nozzle quickly adjustable.

Other Littell safety devices include Pres-Vac Safety Feeders for picking up and feeding flat-surfaced materials; also, air-operated Mechanical Pickers for feeding pieces that vacuum lift will not pick up.

Littell makes a complete line of Automatic Reels, Feeders, Straighteners, REQUEST BULLETINS Scrap Cutters, etc.

**F. J. LITTELL MACHINE CO.**  
4153 Ravenswood Ave., Chicago 13, Ill.

MODEL  
175  
HYDRAULIC  
MARKING  
MACHINE



## QUICK MARKING FOR PART NUMBERS

### MARKING BY ROLLING IS FAST . . . ECONOMICAL . . .

Identification numbers have become an essential factor in production. With this machine you can mark flat surfaces as well as around peripheries on your various components. Trade marks . . . Names . . . Instructions, etc., are permanently rolled into your parts. Send prints showing parts, desired marking and its location on the part for quotations.

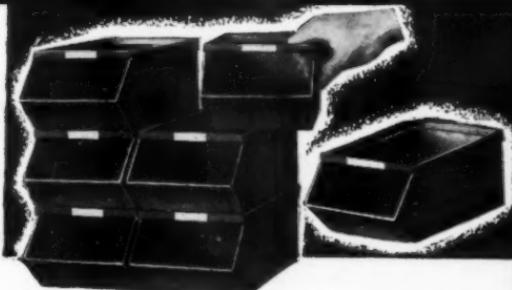
DESIGNED AND MANUFACTURED BY

**GEO. T. SCHMIDT, INC.**  
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# Parts...

- ★ Where You  
Want Them . . .
- ★ When You  
Want Them



You'll save time, space and labor handling parts and material when you use these patented STACKBINS. STACKBINS keep parts instantly accessible — eliminate waste

hand motions — stack compactly to form units of exactly the right shape and capacity — make order filling or assembly work faster, easier, more efficient.

*Manufactured and sold in Canada exclusively by Walter H. Wickware, Ottawa  
Write Stackbin Corp., 1085 Main St., Pawtucket, R. I.*

# STACKBIN

"Stacked and



# SYSTEM

Still Accessible"

maintain maximum efficiency and if the funds are not available internally, are quick to borrow. If you need money, if you can put it to profitable use and pay back when due, borrow it. It is unwise to use too much of your personal funds for business purposes. If you can increase your efficiency by the use of additional money, and cut costs, thereby increasing profits more than the money will cost you, then you can use more credit. That is the way the big fellows figure. The user of machine tools won't go wrong following the same reasoning. Of course, this involves planning. Some concerns plan their credit requirements a number of years in advance.

Do not use short-term loans to invest in fixed assets. That is the function of the long-term loan. Renewing short-term loans continually may indicate that you are considering them on a long-term basis, which is not relished by a banker. A banker may arrange a short-term loan as needed, but it is better to ask for a line of credit, an

advance commitment to lend money up to a certain maximum, usually on a revolving basis, so that you may have more than one loan out at a time, providing you keep within the maximum agreed. Keep a line of credit working. If it lies idle, the banker may cancel the arrangement. Big companies may have lines of credit with five or six banks, but the smaller businessman will do well with one.

Term loans are long-term accommodations, average time five years, frequently unsecured at low interest rates, payment usually out of earnings. Up to now, big companies have almost exclusive access to the term loan but the American Bankers Ass'n. is trying to evolve a plan to make term loans via commercial banks to small businessmen. The user of machine tools, if he needs such accommodations, should talk to his banker to get current developments on this subject. Such loans sometimes run 15 years. A term loan may be used to stabilize the financial set-up over a period of years. Mortgage loans are related to term loans. Bank credit groups, whereby they set up "credit reservoirs" to meet the loans that an individual bank cannot handle are being formed by this ass'n as an aid to small businessmen on all forms of bank credit.

Some banks offer installment loans for a year or less, from \$100 to \$3,000, repaid monthly in installments. Sometimes you can get a lower rate by offering collateral, but, if possible, do not have your wife sign a note or offer your home or life insurance as collateral. The rate varies from seven to 20 per cent.

## BURR KEYSEATERS

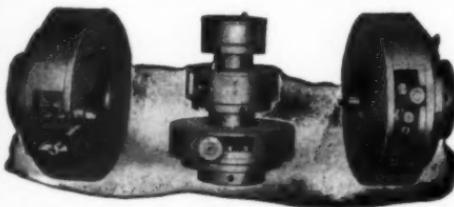


Mill keyways in the run or on the ends of shafting already erected— save money on alterations, erection, and repair work.

Made in 4 sizes, for hand or motor operation.

Write for Bulletins and prices.

**JOHN T. BURR & SON**  
429 Kent Ave., Brooklyn, N. Y.



## MUMMERT-DIXON FACING HEADS with Automatic Feed

One-way Tool Feed — 6, 9 and 12" sizes.

Two-way Tool Feed — 9, 12, 16, 20, 24, 30, 36, 40 and 46" sizes. Save many costly set-ups.

Bulletin No. 4141 Gives Full Details

**MUMMERT-DIXON CO., 122 Philadelphia St., Hanover, Pa.**

Banks make loans on accounts receivable, notes receivable and installment accounts, either on a notification or non-notification basis. In the former case, the bank does not notify the debtors, you collect. The latter method is more satisfactory, but the rate is higher. However, some states require notification.

Bank loans secured by lien on new or used equipment bought may run three years or longer. Compare the cost with the rates given by equipment manufac-

turers and distributors for financing the purchase. It may pay to borrow from the bank instead of buying on time.

Some banks lend money on warehouse stocks or goods put in warehouses, using as security a receipt issued by a warehouse and sometimes businessmen store their goods on their own premises, called a "field warehouse," in which case a commercial warehouse takes custody and issues a warehouse receipt, occasionally called a trust receipt as security for the loan. Your bank, the Chamber of Commerce, or the local telephone directory will help you locate a warehouse in your territory.

Interest is computed in different ways on loans. Figure it correctly to know what you are paying for the credit. The situation is more complicated than years ago by charges for investigation, minimum deposit balance requirements, service charges, collection charges on delinquent accounts, etc. Reduce the total charges to an in-

**Accurate Hole Transfer Made Easy With  
NIELSEN TRANSFER SCREWS**



Simply insert in holes, invert, strike sharply and you have centers and drill circles perfectly located. Reduce time and eliminate spoilage of other methods. 7 sizes U.S.S.—Inexpensive—last for years.

*Write for Circular*

**NIELSEN TOOL &  
DIE COMPANY**  
1962 W. Eleven Mile Road,  
Berkley, Mich.

**AMES Precision BENCH LATHE**

Known for 40 years as a precision lathe of the highest quality. Bed 36" long. Ball bearing headstock uses 1" capacity collets. Swing 8 1/8" over bed. Available with motor drive.

*Send for Catalog*



**AMES PRECISION MACHINE WORKS**  
WALTHAM 54, MASS., U.S.A.

**SPEED-UP  
DRILLING  
AND  
TAPPING  
JOBS**

The easiest way to cut production costs on drilling and tapping jobs is to use John's Drill Jigs.

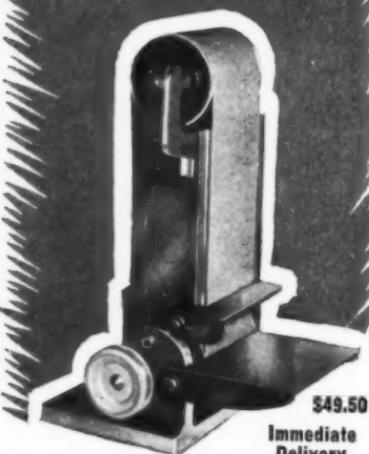


These sturdy Jigs are now provided with universal jaws which permit quick setting for end drilling and tapping. The reversible V-plates accommodate a broad range of diameters.

*Let us send details.*

**HEUSER MFG. CO.**  
1638 N. Paulina St.  
Chicago, Ill.

# WOODS



**\$49.50**

**Immediate  
Delivery**

## MODEL 40: BELT SANDER

**Cut production cost with The Woods**  
—Model 40 Belt Sander . . . The versatile sander that can be operated either vertically or horizontally, thereby performing double duty and assuring utmost production. With its small positional platen this machine is equally adaptable to tool grinding as well as sanding operations.

**The Woods**—Model 40 Belt Sander is a precision built machine with . . . heavy duty New Departure dust sealed ball bearings . . . reversible platen, assuring maximum efficiency and continual flat work surface. Adjustment of tenion and Belt Tracking is accomplished with simple thumb screws.

Write today for data as to what The Woods—Model 40 Belt Sander can do for you.

**WOODS ENGINEERING CO.**  
NORWALK, CONN.

terest rate per year on the average available unpaid balance.

For example, if you borrow \$2,000 at six per cent with interest (actually discount) deducted in advance, \$120, and you must maintain an average balance of 20 per cent, or \$400, you pay \$120 for the use of \$1,480 a year, or 8.11 per cent interest. Or if you borrow \$2,400 for one year at six per cent discounted in advance and must pay the principal in \$200 monthly installments, the discount is \$144 and you have available the first month, \$2,400 minus \$144, or \$2,256. The second month it is \$2,256 minus \$200, or \$2,056, and so on. Deducting \$200 monthly in this way, you will find that you enter the 12th month with \$56. Add \$2,256, the amount you started with the first month to \$56, the amount available during the 12th month and you get \$2,312. To get the average available unpaid balance, divide by two, which gives \$1,156. Divide \$144 by \$1,156 to get the interest rate, which is 12.46 per cent annually.

Many users of machine tools pay a higher rate of interest for credit than they think because they do not figure it properly. In the case just cited, at first blush, it looks like six per cent interest a year, \$144 for \$2,400 credit, but when you figure the actual funds available to you on the loan, and that's what you must base your calculations on, then you really pay 12.46 per cent interest annually, or more than twice the charge that appears on the note, in the advertising matter or quoted verbally.

The user of machine tools who gets the credit at least expense to his business is in the same category as the businessman who buys materials or resale merchandise for less. He has an advantage over his competitor and altho one may operate more efficiently with expensive credit than with no credit at all if one can make profitable use of the money, yet, it is good business practice to know what your credit costs you. Then you are in a position to compare it with other credit sources and probably, effect a substantial saving.

Because the government is trying to keep interest rates down in order to

## The Model O Keyseater

The Baker Model O Keyseater provides speed, accuracy and alignment of the finished Keyseat. Operated on the draw cut principle: is equipped with a push-button controlled, non-reversing type, 2 HP, 1200 RPM motor, mounted on a pivoted base; crank action adjustable for setting stroke from 0 to 9". Standard equipment includes cutter bars of  $\frac{1}{2}$ ",  $\frac{5}{8}$ ",  $\frac{13}{16}$ ", 1", and  $1\frac{5}{16}$ " diameters.

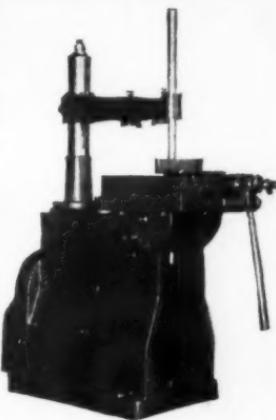


First star:  
October 21, 1944

Second Star:  
June 25, 1945

Capacity ample to cut Keyways in mild steel up to 9" long by 1" wide at a feed of .005".

Write for illustrated circular



## BAKER BROTHERS, INC.

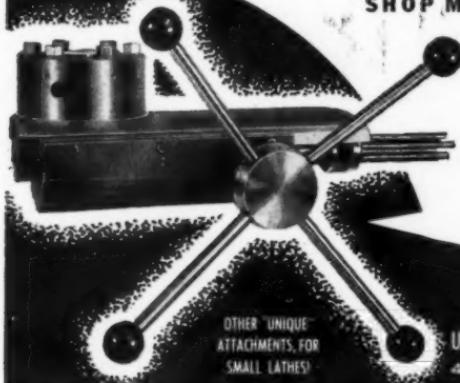
Drilling, Boring, and Tapping Machines

TOLEDO, OHIO

for **SPEED** plus **ACCURACY**

USE **UNIQUE** **BED TURRET**

FOR 9" SOUTH BEND WORK-  
SHOP MODELS A, B, AND C.



OTHER "UNIQUE"  
ATTACHMENTS FOR  
SMALL LATHES!

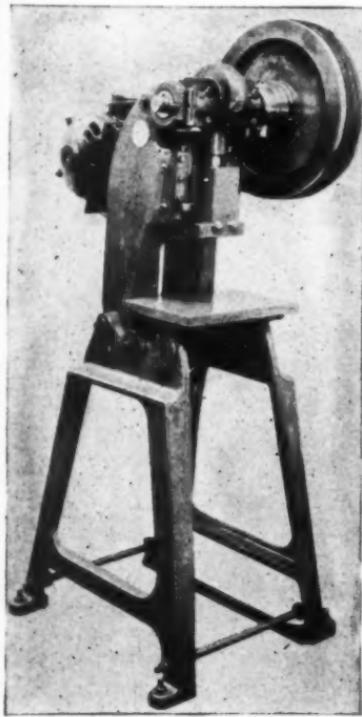
May Be Installed In A Few Seconds!  
Six Tool and Stop Positions!  
Automatic Indexing!  
4 1/4 Inch Working Travel!  
Hardened Index Bushings!  
Built To Stand The Gaff!

CATALOGUE SHEET  
AVAILABLE TO  
DEALERS

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Immediate Delivery  
\$450 F.O.B. Hartford  
Less Motor



Other HUB Presses now  
available, write us —

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**HUB POWER PRESS**  
**W. F. BREWER MACHINE CO.**  
**75 Laurel St., Hartford 6, Conn.**

keep the government outlay for interest on its bonds at minimum and because banks hold heavy investments in government bonds, these institutions are looking elsewhere for revenue and have developed newer forms of lending, consumer credit, accounts receivable financing, etc. Many more banks than formerly are seeking and handling a broader variety of credits than in pre-war days. Mortgage interest rates are dropping too. Reports have it that some banks are offering mortgage money at less than four per cent. The user of machine tools may find it advantageous to look into this if he has a mortgage on his property that may be refinanced at a lower rate.

Sparks are deliberately created inside electric motors sealed in tanks of 100-octane gasoline fumes in one of the tests that led to the development by Westinghouse engineers of motors that can be used safely in explosive atmospheres.



### BREUER NO. 46 BLOWER

An improved electric blower for blowing out dust, dirt and lint from motors, machinery, etc., is announced by the Breuer Electric Mfg. Co., 5118 N. Ravenswood Ave., Chicago 40, Ill.

Basic features of design of this new and improved unit, known as their model



No. 46, are said to include:—Balanced fan design, with solid, full-diameter back, which provides greater air displacement and adds strength and durability.

Screened openings, placed at strategic points around sides of the motor housing, are claimed to permit concentration of

air over commutator and brushes, providing a more effective and larger volume of cooling air where most needed. Size of openings conforms to government specifications.

Improved switch, installed at end of handle, gives better balance and provides easier operation.

Unit is equipped with a 1/3 hp G-E universal motor, with sealed ball bearings that require no subsequent lubrication. Production is said to be under way and prompt deliveries are assured.

### FLASH-BUTT WELDING PRACTICES

The American Welding Society has recently published a 22-page booklet entitled "Recommended Practices for Automotive Flash-Butt Welding." Prepared by the AWS Automotive Welding Committee and based on a survey of flash-butt welding as used by the automobile industry, this booklet is an adaptation of the fundamental data on flash-butt welding originally published in the Society's "Recommended Practices for Resistance Welding." Included are sections on automotive type steels;



SEND FOR BULLETIN No. 23-B



## KEEPS MACHINISTS FROM WASTING TIME

You will eliminate many costly hours from your payroll by using the JACKSON TIME-SAVING VISE. It saves the time wasted by your Machinists in hunting for Bolts, Clamps, Angle Plates, etc., when rigging up work on the Drill Press, Miller, etc. Of still greater importance is the saving in output you effect by not having your productive machine standing idle during the rigging up process, for the—

### JACKSON TIME-SAVING VISE

by means of its revolving jaw and supplementary jaws instantly holds the thousands of shapes that arise in machine work.



**BROWN ENGINEERING CO.**

126 NORTH 3RD ST.

READING, PENNA.

flash-welding equipment; design considerations; tooling; welding technique; and inspection. Typical automotive flash-welding assemblies showing both good and poor joint designs are illustrated by sketches taken from actual production drawings.

Copies may be obtained from the American Welding Society, 33 West 39th St., New York 18, N. Y., at 30 cents per copy.

#### TO CHECK CUTTING TOOLS

Opti-check, a simplified new optical tool designed by Benton Co., 351 South La Brea Avenue, Los Angeles 36, quickly and accurately measures rake and clearance angles on all types of cutting tools and is useful for many precision measuring applications.

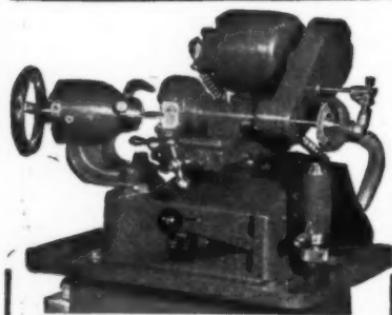
Angular measurements on cutting tools are taken by holding tool in contact with a straight edge mounted on the Opti-check base and aligning precision guide lines in an optical viewer with the cutting edge. Readings are then taken directly from a protractor scale. Both image of tool and the protractor are viewed thru magnifying lenses for greater accuracy and ease of reading. When measuring

angles difficult to obtain by conventional means on large workpieces Opti-check can be used in conjunction with a surface plate.

The optical unit consists of a reticle mounted in a short aluminum barrel and upon which crosslines are scribed. The reticle and tool under inspection are viewed thru a magnifying lens from a normal reading distance.

Base is made in two parts:— the lower portion is equipped with a straight edge against which tool is held. A dovetailed slide in upper portion enables lateral adjustment of optical unit and contains a bushing in which optical assembly is snugly inserted. Optical unit may be rotated in bushing independently from pointer, thus providing a zero adjustment of crosslines. To obtain a reading, the bushing and optical viewer are simultaneously rotated by pointer until a crossline parallels cutter angle. Magnified angular readings are then taken directly from protractor scale thru a second lens permanently mounted in pointer.

Opti-check verifies correct cutting angles, exact clearance angles and uniform length of cutting lips on all tools up to 1" in diameter, and can be used for checking drills, reamers, counterbores,



#### HYBCO TAP GRINDERS

Sharpen **ALL** The Vital Points  
CHAMFER • FLUTES • SPIRAL POINT

Fast—easy to operate. Complete—no parts to change. Capacities—No. 2 to 1½" hand tops—with interchangeable heads.

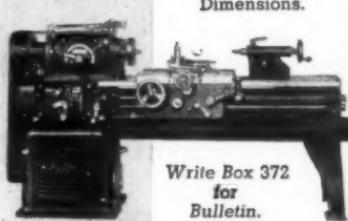
HEADS ONLY AVAILABLE FOR USE ON  
UNIVERSAL TOOL & CUTTER GRINDERS.

Write for Circular MTG

**HENRY P. BOGGIS & CO.**  
1279 W. Third St., Cleveland 13, Ohio

#### CARROLL AND JAMIESON LATHES

15" AND 16"



12 Speed Geared  
Head Motor Drive  
Timken Mounted  
Spindle.

Modern Design—  
Liberal  
Dimensions.

Write Box 372  
for  
Bulletin.

**THE CARROLL & JAMIESON  
MACHINE TOOL CO.**

BATAVIA • OHIO U. S. A.

milling cutters, forming tools, lathe tools, etc. The instrument readily adapts itself to many other inspection and measuring problems.

There are no fast wearing parts or complicated mechanisms to get out of adjustment and readings may be taken to an accuracy of 15' of arc.

Duplication of the most efficient cutting and clearance angles for a particular job is easily accomplished and tools may be inspected on the grinder for accuracy or on the machine for production wear without removal from machine.

#### FOLDING STEPS FOR TRUCKS

Savings in time, reduction in accidents, driver fatigue, and the number of hernia cases among truck drivers, are claims made for a new quick-acting folding step for trucks and trailers.

The manufacturer states that these steps are engineered for use on flat racks, stake bodies, vans, trailers and semi-trailers, and are easily installed with four bolts. In closed position the steps are compactly folded under the truck bed. When the simple trip is manually operated, two sturdy 16-inch slip proof steps instantly swing down and lock in open position ready for use. A slight lift and

push on the bottom step swings and folds them back under the truck bed where they are automatically and securely locked in closed position out of the way.

These steps are manufactured by the Safety Step Company, 1017 South La Brea Avenue, Los Angeles 35, California.

#### TAYLOR UTILITY HOIST

Originally designed for the U. S. Army Air Forces, these sturdy and versatile hoists weigh less than 40 pounds, with a gear ratio of 24 to 1, 2000 pounds can be lifted easily. Because of its light weight, one of these hoists can be transported and installed easily at any point where heavy lifts must be made.

Housing, cover and cable drum are made of aluminum for weight saving. Working parts are of high grade steel.

Other features include:—bronze worm gear; 18 ft. preformed steel cable; forged steel cable hooks; sturdy brake and ratchet; ball and cast bronze graphited bearings are used thruout.

Mounted on welded steel base 5"x12" x<sup>5</sup>/<sub>8</sub>" thick, the hoist may be attached to truck body or any other solid base.

For further data address Taylor Machine Co., 1917 East 61st St., Cleveland 3, Ohio.

#### OUR EFFICIENT TOOL DESIGNING

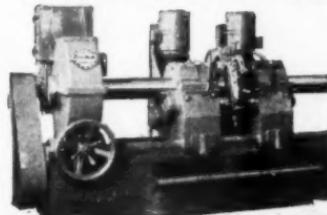
means  
*better production  
at a lower cost*

Efficient tool designing in post-war's competitive production is a "must". Our experience guarantees you tools—designed for economy of operation, resulting in your increased production at lower costs.

**COLUMBUS DIE • TOOL**  
and Machine Co.  
930 CLEVELAND AVE., COLUMBUS ① OHIO

#### Roto-Matic MACHINE TOOLS

• A combination of precision workmanship and advanced design contribute to the quality of output and quantity of work pieces produced on Roto-Matics. Production far exceeds that of standardized equipment used in the metal working industries today, because practically all operations are continuous eliminating down time for loading.



No. 1-A MILLER.

Catalogue B-90 illustrating and describing various types of drilling, milling, reaming and boring machines is available on request.

**DAVIS & THOMPSON CO.**  
MFRS. OF MACHINE TOOLS & MICROMETERS  
MILWAUKEE, WISCONSIN

## MOTORS, A.C. & D.C.

Immediate production on  $\frac{1}{4}$ ,  $\frac{1}{3}$  and  $\frac{1}{2}$  h.p. direct current motors.



Direct Current Motor

We are also manufacturers of A.C. generators, 500 watts to 125 K.W., rotary converters, motor generators, high frequency generators, etc.

Katolight engineers have developed a lot of know-how. Give us a chance on your special requirements.

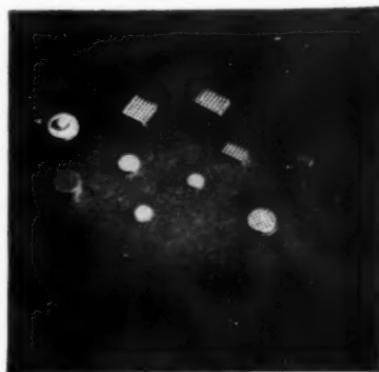
### KATO ENGINEERING COMPANY

1415 First Ave.

Mankato, Minn.

## KENNAMETAL KENGRIPS

Kennametal Inc., Latrobe, Pa. is now producing a line of "Kengrips", for use as durable gripping inserts in various holding, clamping, and feeding devices. "Kengrips" are made of solid Kenna-



metal, in the forms of discs and squares, with diamond serrated surfaces. Four sizes are now available; in either form, viz.,  $\frac{1}{2} \times \frac{1}{8}$ " thick;  $\frac{5}{8} \times \frac{1}{8}$ " thick;  $\frac{3}{4} \times \frac{5}{32}$ " thick, and  $1 \times \frac{5}{32}$ " thick.

## ADDITIONS TO BROACH LINE

Two important additions to the Glenny Adjustable - Expansion Keyway Push Broach line were recently announced.

The first was inclusion of American Standard Keyway sizes at the same prices as the Machinist Standards. The second, broaches in steps of  $1/16$ " diameters for use where standard sizes are not desirable.

Wide use of the Glenny Broaches in occasional keyway cutting and for quantity production in larger establishments brought out the need for these changes. With the line now more complete, this popular broach is expected to become even more generally used.

The company's latest bulletin (No. 10) gives complete information on Glenny Broaches both in individual sizes and convenient tool room sets. Address The East Shore Machine Products Co., 835 East 140th St., Cleveland 10, Ohio.

## RETAINING RING DATA

Highlighting new developments in retaining rings, the latest Waldes Kohinor catalog contains 48-pages of technical data concerning varied applications of seven

## MACO



No. 16  
5 TON  
INCLINABLE  
POWER PRESS  
•  
ACCURATE  
DURABLE  
•

WEIGHT ... 520 lbs.

CRANKSHAFT, dia.  
main brgs. ....  $1\frac{1}{2}$ "  
at C.S. brgs. ....  $1\frac{1}{2}$ "

RAM stand stke... 1"  
maximum stke... 1"  
(to order extra ch'ge)

OVERHANG, center  
of slide to frame  $3\frac{1}{2}$ "

BED, area bolster  
plate .....  $12 \times 7$ "  
Size of opening  
through back ... 7"

MOTOR required,  $\frac{1}{2}$   
HP 1200 RPM \*  
For Further  
Details Write

**MICHAEL AMENDOLA & CO.**  
1059 Washington Ave., Bronx 56, N. Y.

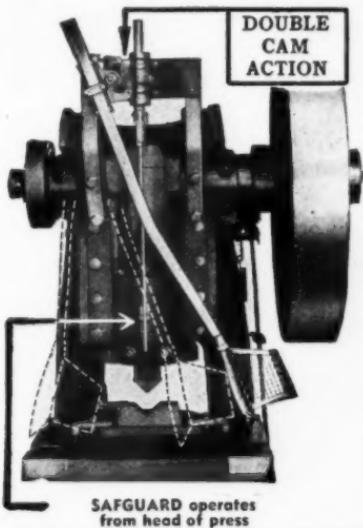
## Save hands with Strand's SWEEP SAFGUARDS

With the Strand Sweep double cam action, you obtain proper sweep movement that prevents accidents. Operation of Safeguard from press head provides additional safety in case of screw or other breakage.

*Send for Circulars on Strand  
Sweep and Enclosure Safeguards*

**STRAND MFG. CO.**

Safety Engineers  
607 W. Lake St. Chicago 6, Ill.



## Timesaver LAPPING COMPOUND



A gear lapped to precision, in assembly, with Timesaver Compound.

You can produce perfect fits, assure quiet operation and save money by substituting Timesaver for expensive hand scraping and running-in operations.

It is easy to use and rapidly produces perfect fitting bearing surfaces.

Used by leading manufacturers for the past twenty years for the fitting of all types of gears, bearings, valves, pistons, slides, etc.

Timesaver Compound will not imbed into any metal or **continue to cut**.

Grades for lapping hard and soft metals.

A request on your letterhead will bring free samples and literature.

**TIMESAVER PRODUCTS CO.**  
31 S. Desplaines St. Chicago 6, Illinois

# DIES... SPECIAL TOOLS



If you need Tools for ordinary production — or if your need is for intricate Tools requiring special development skill, we can serve you.

Through our complete tooling service we are equipped to design and build special tools, dies of all kinds—blanking, forming and finishing for metal—and cutting dies for soft materials.

Write us or phone Buckingham 3417

**Andersons, Inc.**  
2329 NELSON ST., CHICAGO 18, ILL.



basic retaining ring types. Many of these were used on heretofore secret war equipment.

"Before and After" design sketches of many basic and unusual applications show how Truarc retaining rings can be used to save space, weight, machining and assembly costs.

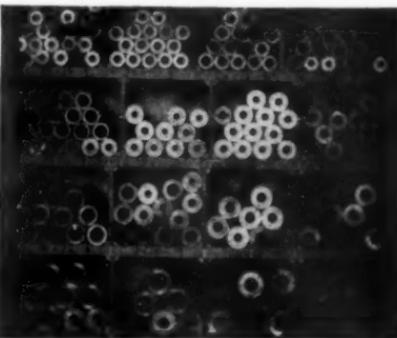
Featuring a radical departure from the conventional type of retaining ring used to lock, secure and position moving parts such as shafts, gears, bushings and bearings, this catalogue shows many new uses for Truarc tapered rings which keep their essential circularity even after repeated assembly and disassembly.

Comparative charts on material characteristics, critical dimensions, thrust loads and impact tests are included. An easy-reference table gives correct retaining ring size and number for every type of commonly used ball bearing. Special pliers fitting ring apertures to speed assembly are also shown.

This illustrated catalogue, of interest to engineers and product designers, may be obtained by writing directly to the Truarc Dept., Waldes Kohinoor Inc., Long Island City 1, N. Y.

## TORRANCE STANDARD BRONZE

A tough centrifugally cast aluminum bronze bushing stock is now available nationally thru jobbing outlets. It is made by Torrance Brass Fdy., Torrance, Cal.



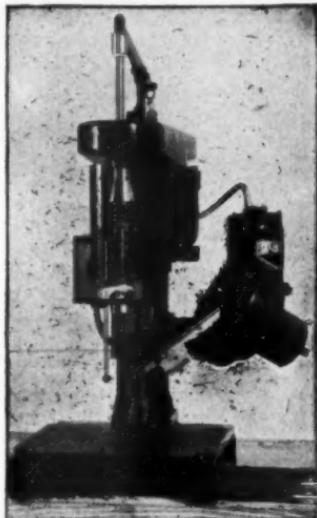
Designated as "Torrance Standard Bronze" the product has been used extensively in the aircraft, automotive, ordnance and maritime industries by large consumers on government contracts. Since release of critical materials for general industrial use, this same heavy-duty

## No. 2 To No. 6

Screws Driven on this Husky but Sensitive Hopper Feed Screwdriver.

No handling of screws. Just place assembly on table, move from screw hole to screw hole. The machine does the rest.

Drives screws at one second each.



## DETROIT POWER SCREWDRIVER CO.

2809 West Fort St., Detroit 16, Mich.



MILL IT  
ON YOUR LATHE

WITH A

### PALMGREN

#### MILLING ATTACHMENT

NOW—you can do milling, slotting, grinding, grooving, squaring shafts, sawing at angles, and many other important operations on your lathe. PALMGREN MILLING ATTACHMENT is a necessary fixture for small shops, schools and emergency work in large plants. Fits South Bend, Atlas, Craftsman, Logan, Sheldon and all other makes. It has 360° graduation for rotary angle adjustments, also graduated feed and adjustment screw. Easily mounted by straddling lathe's regular tool post. Try one—it will quickly pay for itself.

#### IMMEDIATE DELIVERY



Nos.	Width Jaws	Depth Jaws	Jaws	Weight Pounds	Base Opening	Price F.O.B. Factory
150	1 1/2"	1"	1 1/4"	6 1/2	1"	\$18.75
250	2 1/2"	1 1/2"	2 1/2"	11	1 1/4"	24.75
400	4"	1 1/2"	4"	23	2"	39.75

Order from your dealer or jobber. Write for circular No. 350.

**CHICAGO TOOL AND ENGINEERING CO.**

Mfrs. of PALMGREN PRODUCTS for over 28 Years  
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Save TIME and MONEY

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**"BLANER"**  
Universal Hand  
SPRING  
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Every shop and tool room needs it . . . a strong, dependable unit . . . quickly set up in any vise.

Increases production of hundreds of sizes of springs. Right and left.

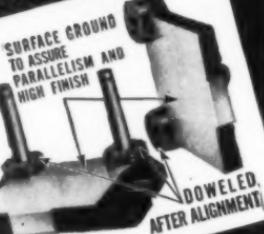
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**BLANER MFG. CO.**

Corner Meek & Elm Sts.  
SHARON PENNSYLVANIA

# BAUMBACH

THE DIE SET  
AUTHORITY



All Baumbach Die-Sets have demountable Leader Pins and Bushings. This exclusive feature permits removing Leader pins for machine work on the die shoe and assures reassembly without loss of alignment. A big time and trouble saver. Write for Catalog.

**E. A. BAUMBACH MFG. CO.**  
1810 S. KILBURN AVE. CHICAGO 23, ILL.

stock bronze has been made available to machine shops and manufacturers with limited stock bronze requirements. Sizes range from  $1\frac{1}{2}$ " to  $6\frac{1}{4}$ " outside diameter with practical inside diameters.

Centrifugal casting insures maximum density, uniform grain structure and total absence of inclusions. In addition the Torrance process allows minimum cleanup because the castings are concentric and have no draft.

Aluminum bronze offers high resistance to corrosion and abrasion, exceptional physical properties, low coefficient of friction and it is 10 to 20% lighter.

The makers say that combining the proven superiority of an aluminum bronze with the accepted advantages of centrifugal casting, has resulted in producing a rugged, heavy-duty industrial stock bronze that will outwear other copper base alloys.

## RYERSON ISSUES PAPER

Issue No. 18 of the Ryerson Steel Pictorial, an 8-page newspaper size rotogravure paper, has just been published by Joseph T. Ryerson and Son, Inc., distributors of steel from warehouse stocks.

Consisting almost entirely of steel application pictures, the paper illustrates with many striking photographs the diversified uses of steel throughout not only the metal working and fabricating industries but also in other lines of business ranging from circuses to salt mines.

Copies of the paper are free and may be obtained by writing to the company at any of its plants at Chicago, Milwaukee, Detroit, St. Louis, Cincinnati, Cleveland, Pittsburgh, Philadelphia, Buffalo, New York and Boston.

## BOOKLET ON ROLL GRINDING

The Norton Co. announces publication of a new booklet entitled "Roll Grinding." It comprises 55 pages of important facts and illustrations and deals with the grinding operation from the selecting of the roll to the factors affecting the results.

A few of the subjects covered are:— grinding hot and cold mill rolls; grinding paper mill rolls, both chilled iron and rubber covered rolls; and the grinding of such miscellaneous rolls as steel-mill rolls, tinning rolls, and copper rotogravure rolls, etc. The last few pages give information concerning Roll Grinding Wheel Specifications. Copies may be obtained from the Norton Co., Worcester 6, Mass.

## BUREAU OF STANDARDS

Printed copies of Simplified Practice Recommendation R214-45, are now available, according to the National Bureau of Standards.

The recommendation establishes a simplified list of types and sizes of hard edge, flexible back, metal-cutting band saws for regular stock purposes. Width, thickness, and number of teeth per inch are given for two types of saws, and general provisions are included covering type of tooth set, shape of teeth, hardness of saw, and tolerances. The recommendation conforms closely to the simplified line of metal cutting band saws included in a limitation order in effect during the war, and its purpose is to retain, for the industry, the benefits resulting from the production and use of that line of saws.

Copies may be obtained from the Superintendent of Documents, Government Printing Office, Washington 25, D. C. for 5 cents. A discount of 25 percent is available on orders of 100 or more copies.

## MASSEY STEEL RACKS

Light the sturdy welded all steel racks for the orderly stocking and handling of rods, bars, rounds, pipe, etc., are offered by Massey Machine Co., 777 Pearl St., Watertown, N. Y.

These racks save labor in selecting and handling stock and are useful in servicing material to automatics, turret lathes and saws.

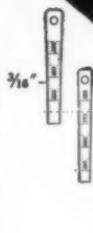
Illustrated is the double type rack. Type SRS-2 is also available for use next to wall.

Flanges on the arms provide a convenient place for size markings.

Two racks should be used to support 12 ft. bars—three racks for 20 ft. bars.

All-steel plate and sheet racks are also available for the orderly handling of plate and sheet iron—as well as roller stands, with three type of interchangeable roller heads, viz flat, "V" and strip roller designs.

Full in SR-46 gives full details.



1/16"

1/8"

1/4"

3/8"

**Keep track of  
hole sizes as  
you bore or  
grind**

Now you can be sure of the exact size of trial cuts in bringing a hole up to size during boring or grinding. With a set of Moore *Direct Reading* Leaf Taper Gages, any hole size can be measured in infinite increments from .095" to 1.005". Simply insert the gage in the hole and read its diameter directly from the gage.

Each leaf in the complete set of thirty-six is a separate tool, accurate to .00025". It may be used individually without interference from any other gage. Graduations on each size overlap the next by .010" ... enable measuring of counterbored or shouldered holes as well as the bottom of through holes to check for bellmouth or taper. Write today for detailed literature.

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72- Union Ave. • Bridgeport 7, Conn.

MOORE  
TOOLS

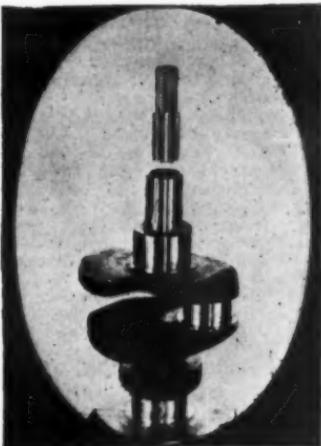
**MOORE DIRECT READING  
LEAF TAPER GAGES**

## CRANKSHAFT THREADING

Crankshaft threading is reported to have been stepped up materially at a large Detroit automobile manufacturer's engine plant thru use of special ground taps, designed and produced by Detroit Tap & Tool Co., 8432 Butler Ave., Detroit 11, Mich. The special steel crankshaft forgings when heat treated for high strength tend to develop a crystalline structure that resists cutting. Conventional taps previously employed, frequently sheared at the tooth roots. Rapid dulling and the tool reconditioning time required seriously impaired production schedules.

The crankshaft requires a  $1\frac{1}{8}$ "-16 NS thread tapped in the front end, concentric with the main journals. The threaded section is  $\frac{7}{16}$ " deep between an outer counterbore and a bottom recess. Both concentricity and pitch diameter have to be held to close limits.

The specially designed ground tap distributes the cutting load over a  $3\frac{1}{2}$  thread chamfer on each of six straight flutes. Eccentric relief of the chamfered section is minimized to provide maximum support of cutting edges and maintain full concentricity of the thread.



It is reported that the reduction in threading rejects, made possible by the use of the new 'Detroit' taps, resulted in sizeable savings due to the many man-

# NEW TEMCO ELECTRIC MUFFLE FURNACE

## Model O F E . . . for Shop and Laboratory



**SPECIFICATIONS**

**Site**—Overall 22" x 34" x 18"  
**Muffle chamber** 6" x 5" x 10"  
**Operating temperature**  
Continuous 1600° F.  
Intermittent 1900° F.  
**Current consumption**  
2000 Watts maximum  
**Shipping weight** 170 lbs.  
**Price**—115V. or 230V. \$194.00

A sturdy, modern electric furnace, with maximum convenience and economy in operation.

On the instrument panel is mounted a dependable pyrometer calibrated to 2000° F. and 1100° C., and a synchronous

motor driven percentage timer which controls the current input. By turning the "TEMCONTROL" knob the heating period is adjustable from 2% to 98% of a one minute cycle, giving close temperature selection over the full heating range.

See your supply house or write

**THERMO ELECTRIC MFG. CO., 486 W. Locust St., Dubuque, Ia.**

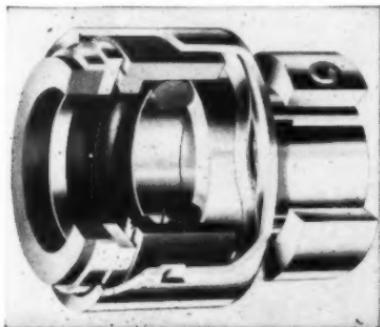
hours invested in the crankshafts prior to the tapping operation. Tool costs were materially reduced by the production of an average of 700 pieces between grinds. Tap breakage was entirely eliminated.

#### "SEALOL CB"

A unique seal for rotating shafts is announced by Sealol Corp., of 45 Willard Ave., Providence 5, R. I. It is designed for original equipment or replacement

and is said to make stuffing boxes obsolete.

The "Sealol CB" is packaged as a complete seal, without any loose parts. No skill or special tools are required to install the unit . . . it slides easily into position on shaft and is locked in place with two setscrews. The only relative movement is at lapped faces and reasonable shaft run-out does not affect performance of seal. It is available in non-corrosive construction for shaft sizes  $\frac{1}{2}$ " to 1", other sizes to order.



#### QUICK-ACTING CAM DOG

According to the Geo. Whalley Co., their new quick acting cam dog fills a real need. A characteristic feature is that the greater the resistance, the tighter it grips, yet it can be released by the "flick of a thumb."

This precision built dog has a tool steel cam, wide enough to dispense with brass shims, that will not dig in or mar. A simple adjustment will give the operator wrench-free, speedy service which means more production per hour. Made in capacities from  $\frac{1}{4}$  to 2 inches. For further information write, Geo. Whalley Co., Dept. 101, 5005 Euclid Ave., Cleveland, Ohio.

# ALMOND...

## Triple Jaw DRILL CHUCK

The Almond Three-Jaw Drill Chucks were pioneers in the field of drill chucks. Since 1872 they have played a necessary part in the logical procedure of machine developments.

Almond Chucks are furnished in nine sizes with capacities from  $3/16$  to 1". They are made for heavy and light duty types with taper or threaded arbor hole — to fit all machine tools and portable tools.

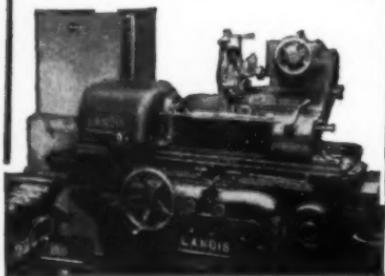
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***The Original  
Manufacturers  
of Drill Chucks***

**T. R. ALMOND CO.**

ASHBURNHAM, MASS., U.S.A.

**Would More Precise  
Temperature Control  
of Liquids or Gases  
IMPROVE YOUR PROCESS  
OR INCREASE PRODUCTION?**



The NIAGARA AERO HEAT EXCHANGER holds the temperature of a liquid or gas within close limits. Many units have been installed because they provide a less expensive and less troublesome way of cooling cutting oils, lubricants and other fluids in an industrial process. But, after installation, users have discovered additional benefits of extra plant capacity, increased production and better quality production.

For further information, write for Niagara Bulletins 90, 94 and 96, or ask about experience in your own field.

**NIAGARA BLOWER COMPANY**

*Over 30 Years of Service in Industrial Air  
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*Field Engineering Offices in Principal Cities*

**NIAGARA**

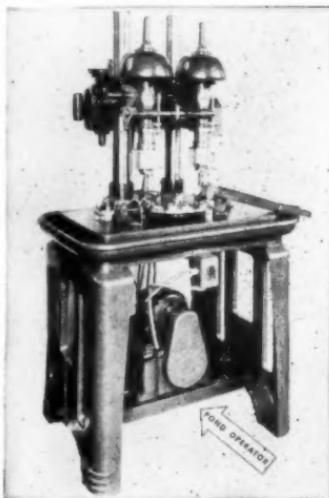
**AIR ENGINEERING EQUIPMENT**

**BRONZE ELECTRODE CHART**

Ampco Metal, Inc., Milwaukee 4, Wis., is distributing a "Comparative Bronze Electrode Chart," which contains the AWS-ASTM classification of bronze electrodes and the grade numbers of arc welding rods produced by 15 manufacturers which meet various classifications. This chart gives a graphic over-all picture of the electrodes available in the bronze field and permits the user to select a type of rod that closely meets his requirements. Trade names and numbers are listed for proper identification.

**AUTOMATIC TAPPING**

The Pond Engineering Co., Springfield, Mass., has designed an automatic control unit to convert hand-operated tapping units to automatics, with a marked increase in the production rate of many small parts.



Accurate indexing, locating, clamping, tapping and ejecting are all accomplished on a turntable fixture actuated by the Pond Operator Model 600. In the machine pictured, two different pieces are handled simultaneously—each piece having one hole to be tapped—and pieces are even separated during ejection, by an ejection chute which is divided in the middle. An attendant is required to feed machine if the pieces cannot be adapted to hopper or magazine feed.

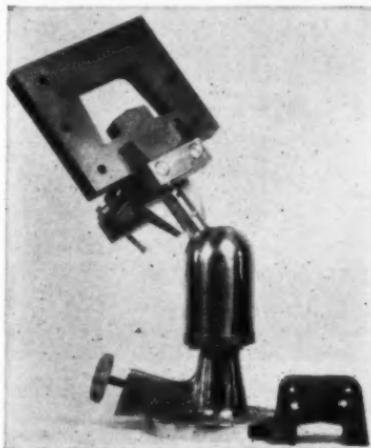
Different pieces of a similar nature can be handled on this same machine, simply by changing holding blocks on turntable. Combined operations—drilling, tapping, reaming, riveting, grinding, and many others are possible.

The Pond Operator is primarily a control unit with a one cycle air-clutch-operated cam shaft, powered by a 1/3 hp motor. A minimum of 70 lbs. air pressure is required. Four air valves are standard equipment, but additional valves and mechanical cams can be added. Cycle speeds are adjustable from two seconds to one minute, depending upon the operation performed, but longer cycles are available on special order. Frequency and duration of impulses per cycle are adjustable on the air valve cams.

#### POWRARM WORK HOLDER

A work holder and positioner with hydraulic fingertip control is now being produced by the Garfield Engineering Corp., Kansas City, Mo. An outstanding feature claimed for the PowrArm is its ability to hold jobs weighing up to 150 pounds in any position while the mechanic works with both hands. Position of work is easily and quickly changed by fingertip adjustment of a pressure control knob.

Universal adapters, available with the PowrArm, permit mounting securely vir-



tually any type of work. It is possible for individual businesses to use adapters

---

## YOU'LL FIND "BLACK DIAMONDS" IN MOST SHOPS WHERE ACCURATE DRILLING IS ESSENTIAL TO SPEEDY PRODUCTION **BLACK DIAMOND DRILL GRINDERS**

### FOR SMALL GAUGE AND FRACTIONAL DRILLS



When you need sharp, small gauge or fractional drills in quantities—it costs real money to put an experienced mechanic to work on them.

With a Black Diamond however even the most inexperienced laborer can keep all small drills sharp, ready to meet any emergency—with lips accurately ground to exactly the same length, proper angle and with correct clearance for fast, precision drilling.

This motor-driven machine cuts grinding costs 50% and more, saves expensive drills to the last useable inch, reduces drill breakage to an absolute minimum and pays for itself quickly.

And when you order a Black Diamond be sure to include the web thinning attachment which accurately grinds Notched, Colton, or so called Crank Shaft points. Write for details.

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**BLACK DIAMOND SAW & MACHINE WORKS, INC.**  
45 NORTH AVENUE NATICK, MASSACHUSETTS

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# HAVE YOU THESE COST CUTTERS IN YOUR PLANT?



## Machines That Need No Power

- You'll find the Famco Squaring Shear ideal for dozens of light jobs. It's a money-saver—first, because of its low cost; second, because it requires no line shaft, motor or electric current. A Famco shear cuts up to 18 gauge mild steel and is made in 22", 30", 36", 42" and 52" cutting widths. (Three largest sizes have "hold down" attachment.) All have front, back and side gauges. Write today for folder.



Famco Foot Presses for light forming and stamping are available in 10 models (for bench or floor mounting). They are low in cost and upkeep.



Famco Arbor Presses, in 32 models, bench and floor mounting, will deliver up to 15 tons pressure. Require no electric power.

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**famco**  
**machines**

COST  
CUTTING

ARBOR PRESSES • FOOT PRESSES  
SQUARING SHEARS

developed for their own particular needs. It is the aim of the manufacturer to standardize, as far as practicable, Powr-Arm uses in the various industries, so that a comprehensive, standard line of adapters can be supplied for most of the work employing PowrArm.

PowrArm has been developed on a new principle:—hydraulic pressure applied to a ball and socket joint. It holds both delicate and heavy work with equal ease and security. Compared with the fastest standard equipment used by the armed forces, it showed as much as 30% savings in certain types of work.

## COOLANTS WITH CARBIDES

That best results when machining with carbides are generally obtained by cutting dry, but that coolants may be needed on certain jobs where it is necessary to maintain a high degree of dimensional accuracy was maintained by Fred W. Lucht, Development Engineer of Carboloy Co., Inc., in a recent discussion. When used, however, coolants should be supplied in large quantities, never in "dribbles," he said.

According to Lucht, carbide tools generally function best when no coolant at all is used. On certain jobs, where it is necessary to maintain a high degree of dimensional accuracy, a coolant may be needed to prevent distortion of the workpiece. In such cases, Lucht advocates the use of a solution consisting of one part soluble oil and 30 to 40 parts of water. This variation in the proportion of water to oil is made necessary by the variations in hardness of water in various parts of the country. The 30 or 40 to one mixture has proved to be an excellent coolant which also keeps the ways of the machine tools free from rust.

Lucht further stated that when using this soluble oil solution a copious flow of the liquid should be directed towards the cut underneath the tool; or at the cut from the side of the tool where the chip flow has the least tendency to interrupt the flow of the cutting fluid. An intermittent flow of the coolant—whether caused by an inadequate flow, an "umbrella" action of the chip, or any other reason—always tends to reduce tool life, he pointed out.

Lucht added that the soluble oil solution has given good results on all types of carbide machining operations except gun drilling. Here, experience has shown that the regular cutting fluids which are normally used for gun drilling give the longest drill life also with Carboloy drills.

## DISSTON OFFERS NEW CARBIDE LATHE FILE

A new light weight cemented carbide file for filing bronze, brass and hardened steels is now available thru the regular distributors for products of Henry Disston & Sons, Inc., of Philadelphia, Pa.

Filing surface of the tool is a carbide insert supplied by Carboloy Co., Inc., of Detroit, Mich. The insert is 4" long by  $\frac{3}{4}$ " wide and is single cut with 34 teeth per inch on the same angle as standard mill files. At present, the file is being supplied in one shape and size and in one cut and may be obtained from stock from any of Disston's "A" type distributors.

The carbide insert is in one piece, thereby eliminating the objectionable joints in files composed of two or more inserts. When one face of the insert eventually becomes worn, the carbide insert can be turned over and the opposite face



used, doubling life of the tool. The holder is of aluminum, for light weight.

The new tool has been designed primarily for deburring or chamfering hardened steels which must be operated at speeds of 450 feet per minute on lathes, both engine and turret. It cannot be used for the hand filing of metal. However, it may be used on molded plastics for hand filing of flat or convex surfaces on which it produces a smooth finish and will not clog.

Very light pressure is required to use the file, the light weight of the tool alone being almost enough to produce excellent results on lathe work.

## LAFAYETTE TOOL CATALOG

A revised General Catalog No. 46 which supersedes all others, is now available from the Lafayette Tool & Supply Co.,

128 Lafayette St., New York 13, N.Y. It presents many new tools. Readers will find this catalog useful when ordering twist drills, reamers, cutters, taps, etc.



## Precision Taps

AT LOW COST

Grinds straight and spiral Flutes

A specialized machine ideally adapted for fluting and gunning of taps, reamers, angular cutters, milling cutters.

In addition the 50F Automatic Flute Grinder sharpens circular metal cutting saws singly or in gangs.

Fully automatic — anyone can operate it. The WARDWELL Mfg. Co., 3165 Fulton Road, Cleveland 9, Ohio.

Write for Bulletin 50F

**WARDWELL**

**Specialists in Developing Saw and Tool Sharpening Machinery**

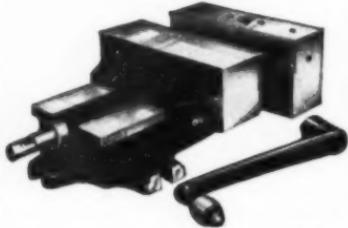
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Illustrated  
Bulletin 41**



## **GRAHAM MULTI-PURPOSE VISE**



Sold plain  
or with  
jig  
at-  
tach-  
ments



### **3 sizes; many uses**

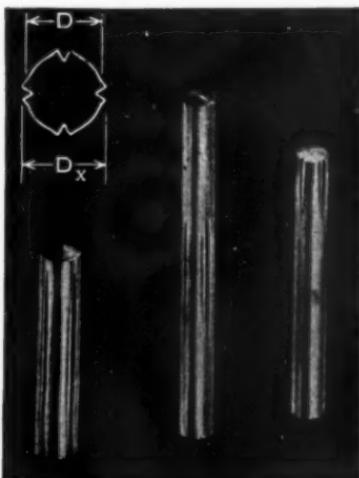
From light drilling to heavy milling and shaper work, this vise holds all sorts of plain and irregular shapes, including positioning for repeat-operation work. Enormous toolmaking savings can result from this "Ready-made" jig and fixture.

Request illustrated price Bulletin 41

**GRAHAM MFG. CO.**  
59 Bridge St., East Greenwich, R. I.

### **SELF-LOCKING DRIVE PINS**

The Driv-Lok Pin Co., Chicago, announce a complete line of standard and special self-anchoring, vibration-proof pins designed to replace more expensive taper pins, keys, cotter pins, set screws and rivets. These pins, which can be pressed or driven into standard, straight sided holes, have four flutes or grooves running longitudinally along their outer surface for the specified "anchoring length". The raised, work-hardened edges of these grooves or flutes provide an expanded diameter of a few (specified) thousandths greater than the nominal diameter of the pin.



When the pin is inserted into a drilled hole, these raised edges are compressed inwardly, providing a resilient, self-locking element which it is claimed will hold indefinitely in spite of vibration or shock without loosening. Flutes are of length and location along each pin to match the thickness (or depth of a blind hole) of the anchoring section so that the pin may protrude as a true diameter, unmarked stud when desired.

Widely used in the automotive industry, these new pins are now provided in sizes and types of general industrial applications where it is claimed they offer many installations and service advantages as keys, pivots, studs, and wherever dowels or taper pins are used.

### ARMOR MILLING MACHINE

Aircraft Machinery Corp., Burbank, Cal., has just completed an informative brochure explaining the characteristics and uses of the new Armor Mill.

This brochure, contains descriptions and specifications, including weights and prices.

It features both horizontal and vertical spindle, one hp with eight speeds and dual belts, 32 power feeds and Timken bearings.

### NEW EQUIPMENT BY FRAY

Among the new equipment produced by the Fray Machine Tool Co., for which printed matter is available are the Fray No. 1B Ram Type Universal Vertical Milling Machine; the Precision boring head; and Fray types 1, 2, 3, and 4 all angle milling attachments. All this equipment is described in separate bulletins which contain specifications and illustrations.

Type No. 1 is a general utility "all angle" attachment; No. 2 is for speedy production or repetition; No. 3 is an all purpose attachment; No. 4 is for heavy work. Further information may be obtained from their national distributors, the H. Leach Machinery Co., 387 Charles St., Providence, R. I.

### CUTS VARIETY OF PATTERNS USING ONLY STRAIGHT KNURLS

In work up to  $2\frac{1}{2}$ " dia., this turret tool produces straight, spiral or checkered knurlings of wide variety.



### FITTING LATHE TURRET

*The Graham  
"Adjust-angle"  
Knurl Holder.*

**Request new  
Bulletin 41**

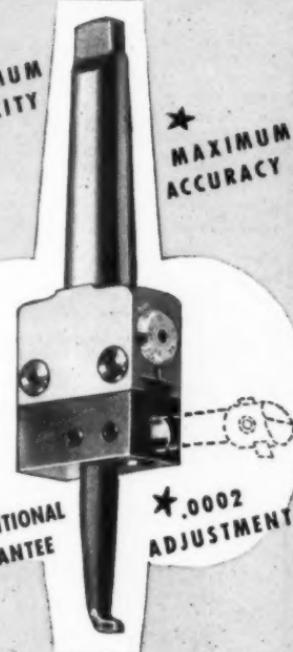


**GRAHAM MFG. CO.**  
59 Bridge St., East Greenwich, R. I.

The

# MAXWELL

Precision Boring Head



★  
MAXIMUM  
CAPACITY

★  
MAXIMUM  
ACCURACY

★  
UNCONDITIONAL  
GUARANTEE

★  
.0002  
ADJUSTMENT

★  
MAXIMUM QUALITY

★ MINIMUM PRICE

• 3 sizes from \$37.50 to \$90.00. Boring capacity  $3/8$ " to 15". Available with any standard shank. Immediate delivery from stock. Circular upon request.

**THE MAXWELL CO.**

386 BROADWAY • BEDFORD, OHIO

THIS IS THE MURPHY  
BALL FLOAT TRAP  
LITERATURE AND  
PRICES ON REQUEST

★  
GUARANTEED

YES...

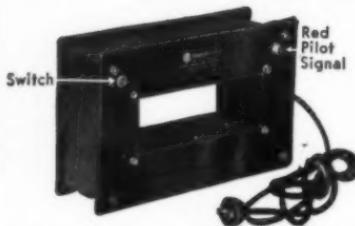
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AFTERCoolers • Separators • STAINLESS • TRAPS  
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JAS. A. MURPHY & CO.  
HAMILTON, OHIO U.S.A.  
Moisture Elimination Up To 2000 Pounds Per Square Inch

## AMC Quick DEMAGNETIZER



A necessity where machine tools are used.

Standard units available and special sizes to order.

Write today for descriptive circular.

**ALOFS MFG. CO.**

1629 Madison

Grand Rapids, Mich.

### GOODWIN COLLET CHUCK

A simplified and sure action chuck to speed operations on lathes, tapping, milling and other machine tools is now available in the Goodwin Quick Acting Collet Chuck.



The Goodwin chuck is solidly constructed and thru the cantilever action of the hardened steel fingers, provides sure, powerful gripping action. Designed to speed chucking operations, it is controlled by a short lever requiring only finger-tip force to open or close the collet. The applied force produces a vise-like grip upon the material. The threaded nose cap is easily removed for changing collets or turned to adjust collet gripping pressure and locked in proper adjustment by a key which engages the spring with engraved slots on inner surface of adjusting collar. The chuck adapter plate is threaded to fit spindle and by machining a light cut from O.D., outer face and I.D. before assembly, accuracy is insured. Can also be supplied with straight or tapered hole to fit motor shafts, etc. The ingenious application of compound leverage as utilized in the Goodwin chuck applies a tremendous force to hold the work secure.

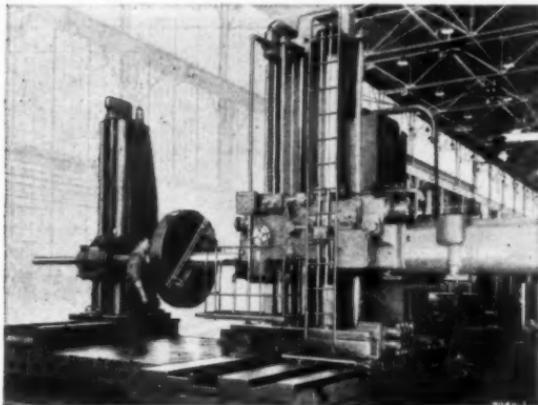
Further information will be supplied by Goodwin Mfg. Co., 1743 Second Ave., Cuyahoga Falls, Ohio.

# Let's Talk Shop

## G. & L. BORING-FACING ATTACHMENT SPEEDS PRODUCTION

A variety of boring, turning, grooving, recessing and threading operations, difficult to handle on ordinary equipment, are simplified by a continuous feed fac-

horizontal boring machine headstock or, with suitable adaptor, on a line boring bar. When unit is placed on headstock, machine spindle extends thru the attach-



Upper Right — Continuous Feed Facing Head mounted on the boring bar of a floor type horizontal boring machine.

ing and boring head manufactured by the Giddings & Lewis Machine Tool Co., Fond du Lac, Wis.

The attachment may be mounted either on the spindle sleeve of the G & L hori-

ment head and operates either independently or simultaneously with the head.

If the continuous feed facing head is used with an adaptor and mounted on a line boring bar, machining hard-to-reach

## BROACHES

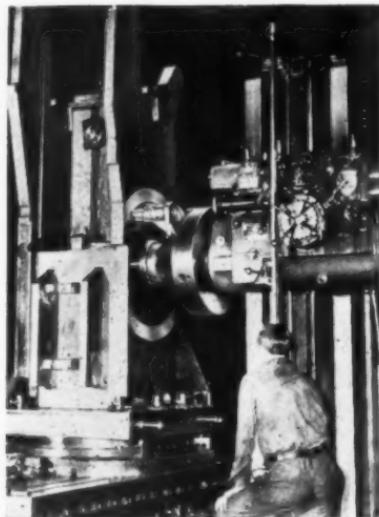
Converted — Reconditioning — Sharpened  
Prompt Service on Sharpening — Manufacturers of Broaches  
*Most Standard Keyway Broaches Carried in Stock*  
Reconditioning, Salvaging and Converting High Speed and  
Carbide Tipped Metal Cutting Tools

**CONANT TOOL & ENGINEERING CO.**

351 West 107th Street

Commodore 0400

Chicago 28, Ill.



Lower Left — Continuous Feed Facing Head used on an interrupted facing cut. The trunnion shown on the part has just been turned.

surfaces is greatly simplified.

A few typical applications are:— (1) for large open and blind hole boring beyond range of standard boring tools; (2) for trunnion, stud or similar turning operations; (3) for internal machining of forging dies; (4) for machining both sides of a workpiece simultaneously using two continuous feed facing heads, one mounted on a boring bar, the other on machine spindle sleeve; (5) for internal and external grinding operations using a special grinder mounted on the tool slide.

Continuous feed facing heads are available in a number of sizes ranging from 17" in diameter to 60" in diameter. Cross travel of tool slide ranges from 10" on a 22" diameter head to 34" on a 60" head. Maximum facing diameter is 32" using a 22" continuous feed facing head and 96" when a 60" facing and boring head is used.

The attachment may be used on all types of G & L horizontal boring machines, and when employed, the machine's working range is increased. Attachment is used for internal and external turning operations, for internal boring, grooving, recessing and threading. It is also used to complete a variety of rough and finish facing and back facing operations when telescopic tools are employed.

## WELDING OUTSIDE CORNERS

By H. F. WILLIAMS

When sheet metal is bent at right angles and the corners welded to form a box like structure, several methods present themselves for the approval of the welder and the engineer.

At A, one side overlaps the other so that an inside weld is required. This is shown by the shaded area. This, of course, leaves a sharp corner that may be dressed off as shown at B. For all practical purposes, the radius of the corner is equal to the thickness or gage of sheet steel used. If necessary, advantage of the size of the welded joint can be taken and cutting the radius to nearly twice the thickness of metal. This becomes obvious in that the outer surface of such a larger radius need only follow the contour of the inside weld, thereby keeping the thickness of metal plus weld the same as the wall



## QUICK ACTING INDESTRUCTABLE CAM DOGS

FAST - RIGID - POSITIVE - DRIVE AND NO MARS  
Operates by a flick of the thumb. No wrench required

Style	A	1/2" To 3/4" Capacity	\$3.00
B	3/8" "	1 1/2" "	4.00
C	1 1/8" "	1 1/2" "	5.00
D	1 1/2" "	2" "	6.00

Quick acting cam dog that fills a long need. Possesses a sure non-marring grip—the greater the resistance, the tighter it grips, yet releases by a flick of the thumb. This precision built dog has a tool steel cam wide enough to dispense with brass shims, that will not dig in or mar.

Time is an element in production, use the tools that use it well. Order now, immediate delivery.

Representatives in principal cities wanted

GEORGE WHALLEY CO.

Dept. 101, 5005 Euclid Avenue

Cleveland, Ohio



## DOWEL PINS



### Immediate Delivery!

Standard Size Dowel Pins from  $\frac{1}{8}$ " to 1" diameter and from  $\frac{3}{8}$ " to 6" length supplied in .0002 and .001 over basic sizes. Unless otherwise specified, .0002, oversize will be furnished.

**SCHULTZ & ANDERSON CO.**

109 Edison Place, Newark 5, N.J.

### ★ THE ★ WONDER CUTTER

The lowest-priced wire and rod cutter on the market. The hardened cutters last indefinitely.

Hand operated. A giant for work, cuts wire and rods up to  $\frac{5}{8}$ -in. round or  $\frac{3}{8}$ -in. square and band iron up to  $\frac{1}{2}$  in. by 2-in. Adjustable stop for repeated cuts to same length. Large or small, your shop can use a WONDER CUTTER.

*Write today for prices.*

**THE FEDERAL FOUNDRY SUPPLY CO.**

4602 East 71st St., Cleveland, Ohio



## RIVETING with a

# GRANT

assures  
you  
the  
utmost  
in  
**RIVETING  
ECONOMY**

These GRANT Riveters are available in Noiseless Spindles and Vibration Hammer types. Also Vertical and Horizontal Multiple Spindle Spinning Machines.

Information? Write!  
**THE GRANT MFG.  
& MACHINE CO. C E Sta., Bridgeport 5, Conn.**

**Micro Supreme**  
**LAY-OUT AND**  
**IDENTIFICATION DYE**

12 COLORS\*

For Tool, Die, Pattern or Template layout on metal . . . Quick identification of stock and parts . . . Shows up in sharp relief—dries instantly—easily removed... Write for circular.

\*Purple shipped unless otherwise specified

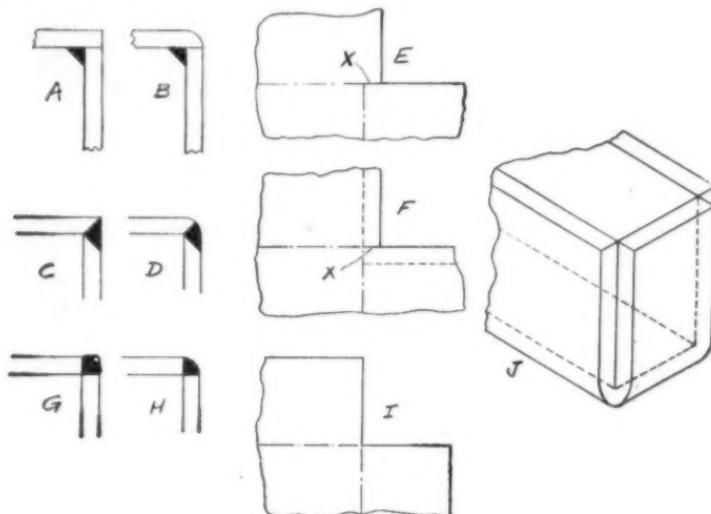
**MICHIGAN CHROME &  
CHEMICAL COMPANY**

6340 E. Jefferson Ave. • Detroit 7, Mich.

thickness. Unfortunately however, if the corner is clamped to form a good looking square, the welding material does not penetrate thru the crack for the entire length of the weld and an unsightly gap appears. In some in-

the skinned edges. (A dotted line is used here for sake of clearness altho in the strictest sense, a full line should have been drawn for an inside and upward bend.)

What is considered an easier joint to



stances this does not matter but when surface appearance is required another form of weld should be used.

To overcome this tendency, the method of corner weld at C is used. The two corners are skinned off at 45° before bending and the 90° included angle that is formed is filled with welding material. If the corner is to be rounded, the effect shown at D results. Some of the welded joint is ground off but the greater part of it remains. This therefore becomes an outside weld.

In the development of the two designs shown . . . the metal is cut out as at E and F, E being for the inside weld at A and F being for the outside weld at C. The metal is bent upwards on the dot and dash lines to a sharp corner on the inside. At X the metal must be slit to a length equal to the thickness. The dotted lines at F denote

make, from the standpoint of the cutting out and welding operations, the method at G, H, I and J is used. The developed piece looks like sketch I. There is no slit required as at X in sketches E and F. The sides are bent upwards and welded on the outside as at G. The finished rough ground and polished corner looks like that shown at H.

If the illustration designated J is studied, it becomes evident why an inside welding job is so difficult. There is hardly room enough between the walls to insert the torch and welding rod, let alone to see what is being accomplished toward getting a good weld.

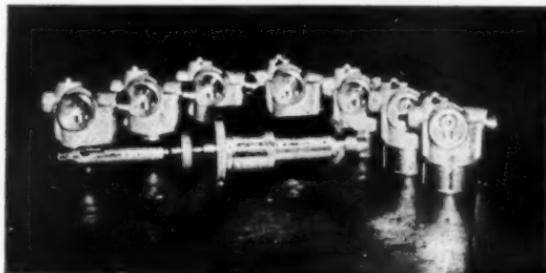
Plant pickling capacity was doubled and costly trouble from soggy, sticky wooden rails was eliminated when Monel rails were installed to guide Army ammunition boxes through the pickling tank.

## PRODUCTION RECESSING

In the development of the tool described here, the chief objective of the designing engineer was evidently to give the production manufacturer a tool which could be used on comparatively inexpensive machinery, which could be operated by unskilled labor and at the same time permit of the highest production rates.

ed up and production rose to 240 pieces an hour.

At present, the tool is run at a surface speed of approximately 200 ft. per minute, and is used in connection with a simple work holding and locating fixture which is mounted to the drill press table. The cutting tool is Tungsten Carbide tipped and working in brass it requires



Bastian-Blessing multi-valves with Scully-Jones recessing tool in foreground.

This tool was designed for the Bastian-Blessing Co., manufacturers of control equipment for high pressure gasses and fluids. It was made by Scully-Jones & Co., 1913 South Rockwell St., Chicago 8, Ill.

The tool produces an undercut of  $1\frac{3}{4}$ " diameter,  $15/32$ " wide and approximately  $3/16$ " deep. The parts machined are brass forging for multi valves, and is used on a Barnes Drill Co. 20" drill press. Originally it was set up to produce 135 pieces an hour. Later on the machine was speed-

only occasional stoning. Soluble (Cimcool) oil is used as a cutting coolant. After clamping the work piece the undercutting tool is brought into cutting position by hand. The automatic feed and return trip-in by the operator. After completing the cut the tool retracts automatically.

Scully-Jones, who made this tool, manufacture special and standard production tools and have for a number of years pioneered and developed high-production recessing tools.

## GLOSSARY OF FORGING TERMS AND DEFINITIONS

The Editors of "Forging", house organ of the Kropp Forge Company and the Kropp Forge Aviation Division, have prepared a Glossary of Forging Terms and Definitions commonly used in forging practice which should prove helpful to those in the industry. They recognize the fact that other definitions are sometimes employed in other industries for describing identical processes or operations, abbreviations or symbols of names of metals and alloying materials. Their glossary identifies forging terms.

## SPANNER WRENCH SETS

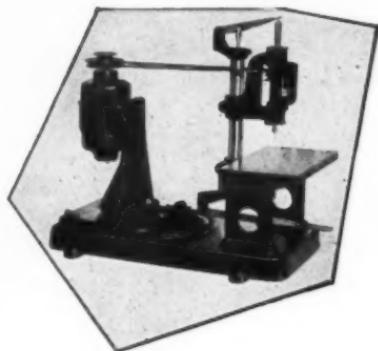
Adjustable spanner wrench sets have been added to the JO Line tools manufactured by JO Mfg. Co. of South Gate, Cal. They come in three sizes which fit

the following range of diameters  $3/4$ " to 2",  $1\frac{3}{4}$ " to 4", and  $3\frac{1}{2}$ " to 6". Each wrench set is of forged steel, heat-treated and cadmium plated. A set consists of a handle, removable screw, a key arm, and three pin arms in graduated sizes. The spare pin arms fit the middle size wrench. With these tools it is unnecessary to carry several wrenches in a tool box as the spanner wrenches fit the range of diameters specified with any standard mechanic's handle.

## GRIP-ALL SAW VISE

The Grip-All Saw Vise is designed for the purpose of splitting steel forgings and salvaging short pieces of bar stock which cannot be held in the ordinary vise of a reciprocating or band saw.

This vise is the latest product of the Aber Engineering Works, Inc., Waterford,



## The L&D Micro-Drill Press Saves Time and Money On SMALL HOLE DRILLING

You get faster precision drilling of small holes with the Lord & Davis Micro-Drill Press. The drill capacity is ".004" to  $1/16$ " and you get greater accuracy, increased production, and reduced operating costs.

**Supersensitive Control.** The spindle has supersensitive control and the operator feeds it at proper speed with only a very slight pressure. Drill breakage and work spoilage are reduced . . . production goes up and costs go down.

**New Adjustable Bearings.** New split-type bronze bearings support the spindle at top and bottom. Bearings are adjustable for wear and give long, efficient service. They provide proper running clearance . . . reduce vibration and assure true running spindle.

**Can Use Pin or Jacobs Chucks.** A Derbyshire Pin Chuck is standard equipment; Jacobs Chucks may be used with an adapter.

**Save time and money on small diameter hole drilling with the Lord & Davis Micro-Drill Press.**  
Write for folder now.

**MASSASOIT MACHINE COMPANY**  
224 Grove Street, Waltham 54, Mass.

Sole Distributor for U.S.A. and Export  
Z. W. BROUILLARD & CO., Springfield 9, Mass.

Wis. It is furnished in two sizes, 2"-6" and 5"-12". This device may also be used as a drill jig or a jig for boring and milling applications.

Its manufacturers say that all parts are designed to remain in alignment and that no adjustment is necessary.

### BULLETIN ON KNU-VISE PRODUCTS

Knu-Vise, Inc. has prepared a new bulletin containing comprehensive information pertaining to their line of toggle-action Knu-Vise clamps, pliers, and wrenches. It includes data obtained in tests of Knu-Vise clamps and pliers and detailed descriptions of the various items manufactured by Knu-Vise, Inc. It is their contention that they manufacture and carry in stock devices for practically every clamping operation encountered in production.

### ELECTRONICS CONFERENCE

The purpose of the 1946 National Electronics Conference, to be held at the Edgewater Beach Hotel, October 3, 4, and 5, is to serve as "a national forum on electronic research, development and application."

Dealing with new developments in communications, television, instrumentation, industrial electronics and theoretical research, approximately 60 papers will be offered at the conference this fall, which is open to all persons having a genuine and sincere interest in electronic development.

Adding interest to this year's conference will be a display of manufacturer's exhibits. These exhibits will consist of educational approaches to various electronic subjects and demonstrate recently developed electronic equipment.

Since a large attendance is anticipated, those planning to attend the conference are asked to make advance registration by mail prior to September 19th. Communicate with E. H. Schultz, Sect'y., Technology Center, Chicago 16, Illinois. No registrations can be accepted after this date.

Every effort has been made to develop a program of outstanding technical excellence with papers presented by authorities in their respective fields.

### THE BASA HAMMER

A soft-faced hammer, designed for work involving surfaces that must not be marred, is described in bulletin (BE-12) of Greene, Tweed & Co., Bronx Blvd. at 238th St., New York 66, N. Y.

This bulletin describes the split-jaw construction of this tool, Basa Hammer, which permits replacement of faces.



Curved Tooth Milling Cutters  
Grip-All Saw Vise - Aber Cherrying  
Attachments

ENGINEERING WORKS INC.

Waterford, Wisc.

Write for  
literature



#### STAINLESS STEEL MACHINING

A notebook of useful information for machining stainless steel has just been issued by the Carpenter Steel Co., Reading, Pa. This 116 page "Notebook on Machining Stainless Steels" contains complete check charts on possible "trouble spots" and gives shop hints on how to cure them. Metalworkers using stainless steel will find detailed information on various operations such as turning, drilling, tapping, threading, milling, broaching, reaming, filing, and sawing, as well as proper use of lubricants and coolants.

The handbook is well illustrated with photographs and diagrammatic sketches throughout. Typical stainless parts are shown and blueprints are provided for stainless machining jobs that have been done at a profit in various plants. Special tables indicate recommended speeds and feeds for machining different types of stainless steels.

Production and management executives may secure their personal copies of the booklet free from their nearest Carpenter representatives, with additional copies available at 30c each.



**Positive,  
Dependable  
Repeat Readings**

When measuring outside diameters it frequently becomes advantageous and time saving not to have to move the items to be checked. The weight of the items or the set-up in the machine may make it inconvenient. To enable checking at the machine we have produced the Mikrosnap which consists of Mikrokator Number 220 with a scale range of .006 and graduated in .0001 set in snap gage frames. For those desiring a closer reading a scale range of .0024 graduated in .00005 can be had. Mikrokator Number 220 is interchangeable in 5 different frames with ranges of two inches to each frame making a total diameter of 0 to 10" capable of being checked. It can be set direct with Johnson Gage Blocks to any desired size thus giving direct reading instead of "feel" as with snap gages.



**WRITE FOR  
CIRCULAR BB**

**SWEDISH GAGE CO. OF AMERICA**  
8900 ALPINE AVE., DETROIT 4, MICH.

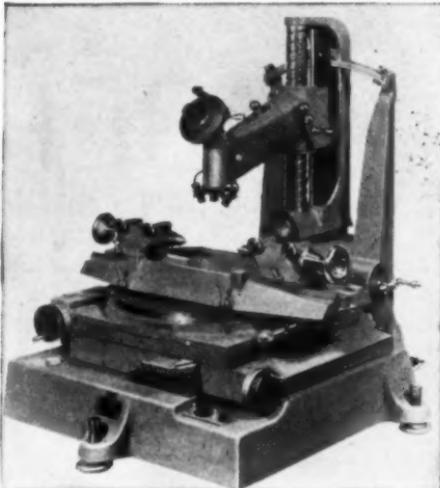
### GAERTNER TOOLMAKER MICROSCOPE

Gaertner announces a new large Toolmaker Microscope having a mechanical stage with a coordinate range of 8 x 4" combined with 360° rotary motion and capable of supporting a load of several hundred pounds. Coordinate motion is by means of micrometer screws which read to 0.0001". Angular measurements can be read to 1 minute.

Principal applications include inspection and measurement of large tools, jigs, templates, machine parts, threads and similar items being held to close tolerances.

The instrument consists of the mechanical stage, a 30 power microscope mounted on a support column which has micrometer tilt up to 15° either side of vertical, a removable cradle for supporting objects not readily mounted on the flat surface of the stage, and suitable surface and substage illuminators.

The microscope is equipped with an internal protractor for rapid angular measurements to  $\frac{1}{2}^{\circ}$  and a Protractor Ocular Head by means of which angles may be read to one minute.



## "OLIVER" 38-inch BAND SAW

Excellent for  
sawing sheet  
metal, composi-  
tions, wood.

Can be placed  
on floor—no pit  
needed.

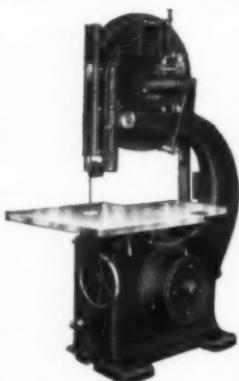
Has Quick-  
Change Rim  
and Tire.

Saw tension  
automatically  
indicated.

Resaw attach-  
ment available.

Write for Folder

**Oliver Machinery Co., Grand Rapids 2, Mich.**



This Protractor Ocular Head is easily removed to permit use of the Templet Ocular Head which accommodates Thread and Radius Templet Slides, all of which are available as accessories. Both rapid and fine focussing adjustments are provided. The magnifying power can be varied from 10 to 100 by means of interchangeable objectives. A camera attachment is also offered as an accessory.

The instrument is described in a new Bulletin 155-64 which will be sent in response to requests made on company letterheads by The Gaertner Scientific Corp., 1201 Wrightwood Ave., Chicago 14, Ill.

*Faster LOADING  
AND UNLOADING  
MEANS FASTER DRILLING !*

**DRILL JIGS**

Esco Engineering Corp.  
13413 EUCLID AVENUE  
CLEVELAND 12, OHIO

## MAGNETIC CHUCK FOR MILLING

The Heavy Duty, 12 x 4 x 3½" Body Flo Magnetic Chuck and parallel, which during the war found wide acceptance for use in tool rooms, on surface grinders, and for production, now lays claim to a wider sphere of usefulness, namely, for milling operations where difficulty is experienced in clamping the work.

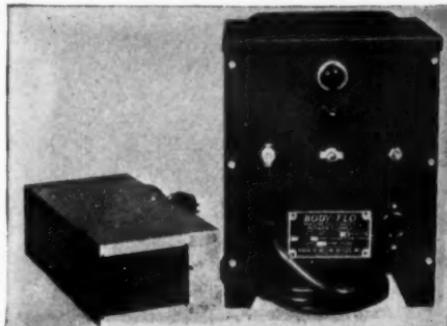
Using climb or down milling with non-magnetic Carboloy or carbide tipped cutters, magnetism offers a simple solution to clamping problems in milling operations.

Power for the Body Flo Magnetic Chuck is supplied by a unit which incorporates two special features:

1—Power selector for stepping up electric current thereby increasing the magnetic holding power;

2—A new magnetizing and demagnetizing switch, said to provide correct timing for the demagnetizing operation and with automatic return to the Off position.

The Body Flo chuck utilizes low-voltage direct current which eliminates



harmful inductive kick-backs which may be experienced with high-voltage magnetic chucks. The automatic demagnetizing feature is desirable since it requires no skill on the part of the operator.

For top efficiency, a remote magnetizing and demagnetizing extension switch may be mounted on the machine tool adjacent to the operating controls.



## SAVE Labor and Time

Eliminate heavy lifting. Cut handling costs. Table swivels and locks in any position. Can be varied 15½" by slight foot pressure, leaving operator's hands free. Engineered and built by tool engineers, experienced in production of special machines, dies, jigs and fixtures for exacting requirements.

*Send TODAY for illustrated catalog No. 2.*

**MIDWEST TOOL & ENG. CO.**  
112 Webster St., Dayton, Ohio

**WHITNEY-JENSEN PRODUCTS**  
30 YEARS EXPERIENCE

## No. 247 POWER PRESS BRAKE



STROKE—1"

DIE BED—18"

47 STROKES  
PER MINUTE

CAPACITY—14 GA.  
OVER 7/8" 90°  
VEE DIE

*Write for  
Catalog*

**WHITNEY METAL TOOL COMPANY**  
115 FORBES ST. • ROCKFORD, ILL.

## CLEVELAND INDEXING HEADS

Grinders & Fixtures, Inc., 1255 W. 4th St., Cleveland 13, O., offers a new model Indexing Head capable of holding all straight or taper shank tools from  $1/16''$  up to and including  $1\frac{1}{2}''$  in diameter.



## Immediate Delivery FROM STOCK

### GREAVES-SILENT BAKELITE GEARS



No waiting when you order Greaves Silent Bakelite Gears. • We have them in stock NOW! • Your order will go forward immediately. • You'll appreciate the silent operation and added smoothness provided by Greaves Silent Bakelite Gears. • You'll marvel at their great strength to carry big power loads . . . their remarkable ability to successfully operate completely submerged in water. • You'll welcome their low cost. • No metal reinforcements required. • Save Time . . . Money . . . Labor!

We also make silent gears of rawhide and Fibrol.

Write for Circular.



**Greaves** MACHINE TOOL CO.

2013-13 Eastern Ave.  
Cincinnati, Ohio

This model is similar to their previous indexing head and was developed as the result of recommendations from tool users for a unit accommodating all tools in this size range.

Base is drilled for a  $\frac{1}{2}''$  clamping nut and can be set up on any standard grinding or milling machine. The head rotates  $360^\circ$  in three planes on a universal center. Quick-set positive locking devices hold the tool at any desired angle in relation to the grinding surface.

Straight shank tools from  $1-1/16''$  to and including  $1\frac{1}{2}''$  in diameter are securely locked in the indexing head with a Cleveland Collet Chuck secured in the conventional manner with a pull-in nut. Taper shank tools from  $1-1/16''$  to  $1\frac{1}{2}''$  in diameter require use of a taper tool holder or conversion sleeve, and the quill is ground to receive the No. 13 B & S sleeve. Tools from  $1/16''$  to and including  $1''$  in diameter require use of a two-piece adapter set.

A new bulletin (Form 462) fully describes this accurate, calibrated tool holder for resharpening or grinding taps, counterbores, end mills, miller cutters, reamers, lathe tools, etc., in any simple or compound angle.

## DAKE OFFERS NEW PRESS

A new electrically operated hydraulic press, called the "Elec-draulic" press, has just been announced by Dake Engine Co., Grand Haven, Mich. It is applicable to assembly, straightening, bending, forming, and pressing operations in the manufacture and repair of automobiles, appliances, farm equipment, and other mechanical products. It is supplied in 50- and 75-ton capacities, with all pressures under fingertip control and release valve. No hand pumping is ever required.

Features include variable ram speed—from zero to six inches per minute—and movable workhead, which is easily moved to any point along top channels for off-center work. The press is particularly applicable to production-type use because of the effortless operation, and any desired pressure can be obtained instantly from the constant-running motor. Safety is assured by a dump valve which protects the press against overload.

Frame is rigidly constructed of arc-welded steel, reinforced throughout. A pressure gauge at eye level allows easy reading. Press table height is quickly changed by means of a hoisting crank, and use of the press is speeded by quick-action auxiliary ram return on release of the pressure valve.

## MICHIGAN TOOL PRODUCTION LEAD COMPARATORS

A new line of production lead comparators for use in gear production shops has been introduced by Michigan Tool Co., 7171 E. McNichols Road, Detroit, Mich. Known as models 1200 and 1200A, these comparators are designed for use on the production floor alongside gear cutting and shaving machines. The master multiple thread lead, followers, indicators and actuating mechanisms are all enclosed.

They may be used in setting-up gear cutting and finishing machines, to check gears after processing, to determine lead compensation for "unwinding" of gears during heat-treat, etc.

The machines are applicable to external and internal gears as well as to worms. To change over for checking gears of different leads, it is necessary only to change the master lead to one having a corresponding lead. Different gears of the same lead may be checked by the use of interchangeable mandrels, etc.

Model 1200 will check helices (up to 45°) at several points around periphery of internal or external helical gears. For larger helices and to check leads on worms, 1200-A Comparators may be used. Both comparators will handle work with a maximum swing of 10".



Quick mounting is made possible by use of tapered expanders and split bushings to secure the gears. No tools are required for this operation. Gears may be checked in both green and finished state by using corresponding sizes of bushings for the I.D. of the gears.

One type multiple lead master has four threads, which provides for checking at four points on periphery of gear. Master leads are ground to a high degree of accuracy.

## SCREW THREAD INSPECTION

A 60-page brochure has recently been published by the Johnson Gage Co., Bloomfield, Conn., with a thoro description of their approach to "inspection" and "quality control" of male screw-threads.

It is a combination of 10 pamphlets, each dealing with a particular phase or operation. Such things are included as a comparison chart of gages for checking

external screw-threads, and a summary of special internal thread work. Sections on inspection, purchasing, quality control, etc., are complete with diagrammatic sketches, illustrations, charts, and careful explanations.

It is a well arranged brochure and should prove exceedingly useful to persons in the screw-thread industry.

## SALES MANAGER

Experienced: Sales of Machine Tools, Metal Fabricating Equipment, Sales Promotion, organize territories, quotas, systems, reports, customer correspondence, engineering Sales letters. Assume direct charge of Salesmen.

An excellent opportunity with a Chicago concern for an aggressively active sales organizer and Manager.

Address replies to Box B-50

c/o Hitchcock Publishing Company  
542 S. Dearborn St. Chicago 5, Ill.

## New Nesting Type Tote Pans

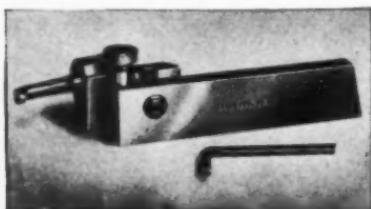


20" long x 12" wide x 6 1/2" deep.  
16 ga., drag holes and handles both ends.

J. L. LUCAS & SON, INC.  
BRIDGEPORT, CONN.

### GIVES VERTICAL ADJUSTMENT

A new Holder for Boring Tools in lathes, providing vertical adjustment, is offered by Bokum Tool Co., 14775 Wilde-mere Ave., Detroit 21, Mich., and de-scribed in Catalog 464.



Adjustments can be made quickly by means of a conveniently located knurled screw which moves the tool in a vertical plane to bring it to any required precision setting.

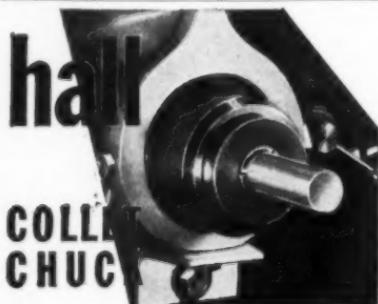
It is made in two sizes, with  $\frac{3}{8}'' \times 1''$  and  $\frac{1}{2}'' \times 1\frac{1}{4}''$  shank sizes.

### GAGING FILE ACCURACY

Here is a practical adaptation of a regular model Federal Dial Indicator as an integral part of a gage specially designed

for precise dimensional inspection of Nicholson Files.

The gage, which checks width of the files, assures uniformity in this important dimension. The operator, who does not have to be an experienced inspector, with a highly developed sense of "feel" is able to see on the indicator dial whether width of the files is within tolerance or not, and if the dimension should be outside of tolerance, then exactly how much it is out, plus or minus. This is clearly revealed on the indicator.



**SPEED UP** production in multiple operations with push-out type Hall Collet Chuck. Full spindle capacity or over. Tremendous grip over or under stock size to .007—without adjust-ments...no bearings, friction, heat or loss of power. Instant release with-out stopping lathe.

Two-inch capacity, now only \$145

One-inch capacity, \$95

Round, square or hex collets, plain—serrated  
**HALL MANUFACTURING COMPANY**  
622 Tularosa Drive • Los Angeles 26, Calif.

Federal Dial Indicating Gages which are made by Federal Products Corp., 1144 Eddy St., Providence 1, R. I., thus play important roles in maintaining the high standards of precision manufacture of well-known products.

### DATA ON DIAMOND TOOLS

A 20-page catalog has been published by the Precision Diamond Tool Co. It is a general and brief summary of their research on the latest developments in the scientific and efficient use of diamond tools. Included are two charts which contain such information as the proper size and quality of diamonds for various cases, and general recommendations on the use of diamond tools. The address of this company is 102 S. Grove Ave., Elgin, Ill.

## INSTRUMENT LATHES

For those "small lot" parts which are costly — or the more difficult second operations, the Gilman Instrument Lathe with production accessories, will permit savings on your small part production. High spindle speeds, self-indexing turret, double tool cross slide and rigidly designed throughout, make the Instrument Lathe meet with modern production requirements.

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ENGINEERING & MANUFACTURING  
Corporation

JANESVILLE, WISCONSIN



Many others have, to their lasting satisfaction. Full equipment, splendidly trained personnel, precision inspection, in spurs, helicals, worms, bevels, herringbones. Any gear material, including Micarta or non-metallic Bakelite. Any quantity. Any size to 60". Send us your specifications.

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WORKS  
200-A LAFAYETTE ST.  
NEW YORK 12, N. Y.  
Phone: CANal 6-1440

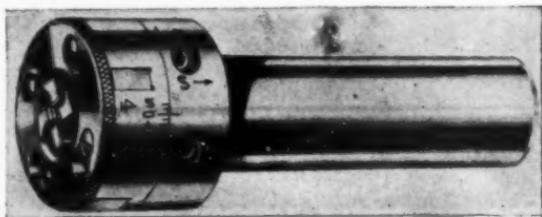
## GEOMETRIC IMPROVES DIE HEAD

Improvements recently made in the Style EJ5 Die Head manufactured by Geometric have simplified construction of this small head and made it lighter in weight. It now has fewer parts, is more compact and can be fitted into more limited space.

Substituting steel retaining rings for the two cam retaining keys and two screws originally used is said to be largely responsible for these improvements. These steel retaining rings are easily removed with a special tool and the head can be disassembled and assembled easily. Grinding cam lug engaging chasers provide a smoother surface and has improved accuracy of the head.

Of special note is the improvement in the new Style EJ5 for Swiss Type Automatics, such as Gorton, Petermann, Ceco, Wickman and others.

Today, an extra light weight die head like the style EJ5 is becoming more popular due to the growing need for speed, accuracy and low cost in threading parts for watches, clocks, cameras and all kinds of small, fine instruments.



Drawing of the new model, full size scale, for Swiss Type Automatics is shown with the old for comparison.

In the new type, the rigid shank fits over spindle and is driven by a cross pin held in position on both sides by the steel retaining ring. Another retaining ring holds head together. The old type used a shank bushing and two dowel point screws which necessitated a heavier shank of greater length.

The new type has a shorter shank, smaller in outside diameter than the old type. Overall length of the new type is much less than the old, and the new type weighs only two ounces contrasted with the former weight of three ounces.

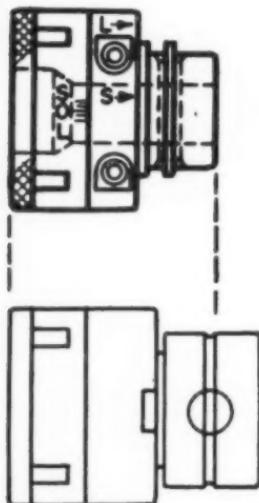
The Style EJ5 equipped as standard with the recently improved forward floating shank can be applied directly to turrets of the No. 00 or the No. 00G B & S Automatic without use of special holders. It has a longer bearing condition which prolongs life of the tool.

The EJ5 die head with new construction is also stocked with a rigid shank and is sold to manufacturers for their aligning holders (such as Alco and B & S). The EJ5 with the threaded backpart for use on the 00G B & S is also available.

In all types of the EJ5 heads, high speed ground thread chasers are now furnished as standard in the 3/32" projection which facilitate cutting close to shoulders and give smoother threads of greater accuracy. All these heads can be used for cutting left hand threads with left hand chasers.

A feature of these heads is the diameter adjustment. The chasers can be adjusted easily to cut within close tolerances by merely loosening the four front plate screws, then loosening one adjusting screw and tightening another to obtain the desired accuracy.

The chasers can be removed easily from the die head by loosening the four



# BURKE

## MILLING MACHINES

Make Fast Work of Small Jobs

Motor  
Driven

Timken  
roller or  
ball bear-  
ings to  
spindle

Write today for  
circulars.



Burke Machine Tool Co.  
297 E. 16th St., Conneaut, Ohio

# Lassy TAPPER\*

AND THREADER (Single Spindle)  
SAVES TIME, TAPS, EXPENSIVE LABOR

Taps twice as many holes, quicker than  
with a tap wrench. Always right angle  
holes. Tap capacity  $\frac{1}{8}$ " thru 1".

STEPPED HOLDING  
BARS. Replace Vise,  
hold work firmly —  
prevent tap-breaking  
torque.

TAP ADAPTERS.  
No extra spindles  
needed. Change  
taps in a jiffy.

DEPTH GAUGE. Al-  
ways show depth  
tap has traveled.

Write for Folder B2  
Immediate Delivery

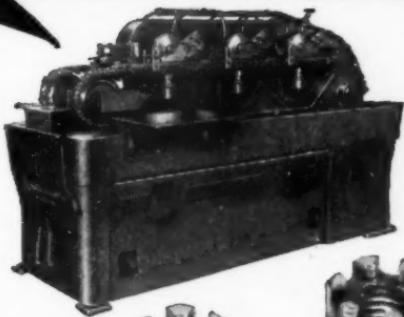
**LASSY TOOL COMPANY**  
PLAINVILLE, CONN.

\*Patents Pending

# "DUPLEX" Nut Slotter!

Adaptable to  
Milling of parts  
of various shapes  
and sizes . . .

SLOTS 2 SIZES AT ONCE. TWO CON-  
TINUOUSLY OPERATING CONVEYORS.  
AUTOMATIC BURR REMOVAL . . . AS HIGH  
AS 3000 SLOTTED PARTS PER HOUR.



**PELLOW MACHINE Co.**

13510 FOLEY AVE., DETROIT 27, MICH.

front plate screws and by rotating the front plate a partial turn to remove the plate. The chasers then may be taken out of head for resharpening or changing to another thread size. Capacity  $1/16''$  to  $3/16''$  (No. 0—No 10), inclusive.

The EJ5 is made by the Geometric Tool Co., New Haven 15, Conn., and their catalog covering the newly improved heads and the four different adaptations of the EJ5 will be sent on request.

#### ELECTRODE INFORMATION

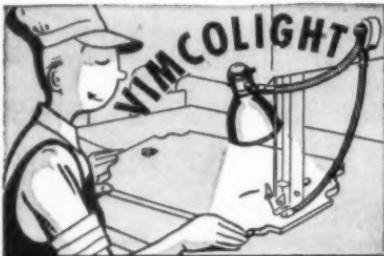
"Jessop Stainless Steel Welding Electrodes," just published by the Jessop Steel Co., Washington, Pa., contains com-

#### Save Space and Lifting

Yohé Racks take less floor space—hold more stock and require less lifting. Four arm rack,  $5\frac{1}{2}$ " high stacks, 10,000 lbs. Five arm rack  $5\frac{1}{2}$ " high holds 12,000 lbs. flat or round stock—at safe lifting heights. Use against wall or back-to-back in center of room.

Let us send details and prices.

WM. S. YOHE SUPPLY CO.  
503 Mahoning Rd., N.E. Canton, Ohio



#### DIRECT LIGHTING . . .

Cuts costs quickly by highlighting critical work areas for accurate, fast performance . . . exposes the danger points for added protection to operators. There is an adjustable VIMCOLIGHT model available for every machine. Easy to attach . . . steady in any position.

On-the-spot lighting from any angle.

**VIMCO**  
MFG. COMPANY, Inc. 109 BRAYTON ST.  
BUFFALO 13, N.Y.

plete information on the selection and application of Jessop stainless electrodes for welding stainless steel. Current range is furnished for each type of rod in varying diameters. Copies of this new 8-page booklet will be furnished upon request.

#### DRAWING INSTRUMENTS

Two new drawing board instruments, designed to simplify the drawing of radii are announced by RapiDesign, Inc., P. O. Box 592, Glendale, Cal. These instruments are in the form of "templates." The desired radius is placed tangent to the ends of the lines to be joined, and the radius stencilled by following the curve. At the same time the radius is automatically located by a small hole in the instrument.

One instrument gives radii up to  $\frac{3}{4}$ ", while the other gives radii up to  $3\frac{1}{2}$ " in increments of  $1/32$ nds. Both are made from transparent plastic sheets.

#### STANDARD DIAL COMPARATOR

A new dial comparator model, designated as No. 101, is announced by Standard Gage Co., Poughkeepsie, N. Y. It is suited to a wide variety of uses due to the extensible indicator support arm and the tapped holes in the platen for securing the work. Any dial indicator having a standard AGD lug type back may be used.

By means of a double clamp arrangement, the indicator support arm may be slid up or down on the vertical column, swung to any angle in either a horizontal or vertical plane, and moved to place indicator at the desired distance from the column. Setting is facilitated by a vernier screw. A friction washer concealed in the swivel prevents the indicator arm from dropping unintentionally when the clamp is loosened for adjustment.

Working area of the platen is  $6'' \times 9''$ . Five tapped holes on either side are spaced  $1\frac{1}{2}$ " and will receive  $\frac{1}{4}''$ -20 bolts for securing the piece being checked.

"When Taps Break Off . . .  
in valuable machine work

#### Walton Extractors

Will remove the broken piece quickly, easily, and cleanly—with no damage to the threads."

Write for folder No. 12 and details of 30 Day Free Trial Offer.

**THE WALTON CO.**  
94 ALLYN STREET  
HARTFORD 3, CONN.



# New STEEL INSPECTOR'S STAMPS



Faster  
Identification  
of Inspectors or Operators.  
Different borders may be used  
for different shifts. Available  
in 4 sizes. Write for prices  
today.

NEW METHOD STEEL STAMPS, Inc.  
142105 CAMPAU DETROIT 7 U.S. 4

# PRECISION PARTS AND ASSEMBLIES

Commercial Heat Treating

Electro Plating

Viking H. S. Tool Bits

Special Taps

AGERSTRAND  
CORPORATION  
MUSKEGON, MICHIGAN

# INTERCHANGEABILITY

Your KEY to  
**MASS PRODUCTION**  
Will Speed up Drilling  
and Lower Costs

## A. S. A. STANDARD PRECISION DRILL JIG BUSHINGS

Standard sizes and styles in stock for prompt delivery.  
Write for catalog showing table of standard sizes of bushings with  
price list and other valuable information for the tool designer.



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Cleveland 8196

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Carlton Eberhard  
Wisconsin 7-9193

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Henderson 6113

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STRATFORD, CONN.  
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\*Stock carried at these locations  
**ACCURATE BUSHING COMPANY, 440 North Ave., GARWOOD, N. J.**

WEstfield  
2-2415

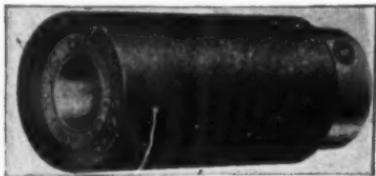
## DUST AND VAPOR COLLECTORS

Individual type Dustkop dust collectors and a vapor collector are described in a new catalog, A-350, available from Aget-Detroit Co., 605 First National Bldg., Ann Arbor, Mich.

Specifications of models with ratings, together with prices of units and accessory equipment, are given in addition to illustrations of typical installations.

## NEW LOVEJOY COUPLING

A new coupling applicable to many machines requiring maximum flexibility, has been developed by the Lovejoy Flexible Coupling Co., 5026 W. Lake St., Chicago 44, Ill. CX Double-flex cannot fall off when driving, and driven units are separated for servicings.



Of one-unit construction, this coupling comes out with shaft when driven unit or motor is moved. A standard L-R body is permanently inserted into the molded synthetic rubber unit, this being permanently secured to the driven shaft, by a set-screw. Molded into the other end are the L-R sockets that engage L-R jaws on the blower hub.

Other advantages include:—Quick assembly in dark or close quarters; no metal to metal contact; tight fit—no rattle, deeper center hole allowing shaft to extend  $\frac{1}{2}$ " into unit; six sizes from  $2\frac{1}{4}$ " to 5" long.

## MOTION PICTURE LESSONS

A series of 16 mm Kodachrome Motion Pictures entitled "Lessons in Grinding" have been made available by the Norton Co., of Worcester, Mass. These are sound pictures. Each film runs between 14 and 30 minutes and covers a particular phase or problem encountered in grinding. The only expense involved is the return shipment to Worcester.

## SYNTRON TOOLS

A catalog illustrating and describing their complete line of electrical tools is offered by the Syntron Co., 300 Lexington Ave., Homer City, Pa. These tools include portable electric hammers, grinders,

sanders, and semiportable hack saws. For this publication ask for catalog No. 464.

Also included are many accessories for these tools. Specifications and prices for tools and accessories are listed.

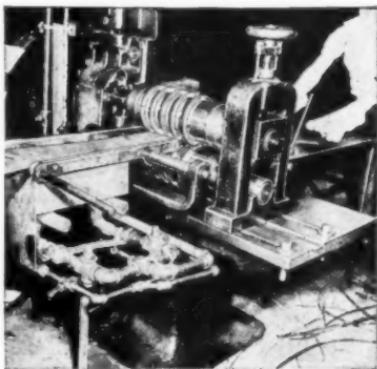
## THERMOSTAT CATALOG

A 30-page catalog has been published by the United Electric Controls Co., 59 A St., Boston 27, Mass. This catalog contains complete information and engineering details on all their thermostat and pressure switches. Many charts, tables, and diagrammatic sketches are included giving details of construction and principles of operation.

## MATERIALS HANDLING CATALOG

This new 2-color "vest-pocket" catalog just released is designed for handy reference, is attractively illustrated and describes the complete line of Mercury Tractors, Trailers and Lift Trucks. Forty-eight pages of detailed information on the construction capacities and designs of all models. Latest-type Gas Tractors and Telescopic Lift Trucks are also described.

The new "Pocket-Catalog," is available free of charge, write Mercury Manufacturing Company, 4120 S. Halsted St., Chicago 9, Ill.



**ON THE JOB ANNEALING**—Many times during spinning operations, the metal becomes work-hardened. To anneal a piece without a loss of production time, engineers at the East Pittsburgh Works of Westinghouse arranged a gas torch near the work. Control of the flame is by means of a foot pedal on the floor. Only a pilot light burns until the operator pushes on the pedal, thus preventing burning of the part.

**MADE OF ALLOY STEEL  
MILLED FROM BAR**

SOCKET HEAD  
CAP SCREWS



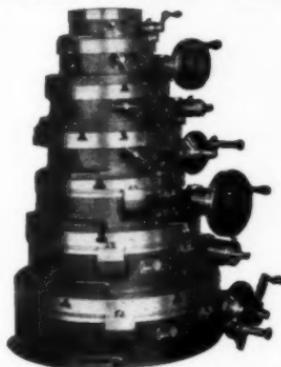
SAFETY HOLLOW  
SET SCREWS

*Try Them On Your Next Job!*

**ECONOMY  
MACHINE PRODUCTS  
COMPANY**

5207 Lawrence Ave., Chicago, Ill.

**TROYKE ROTARY TABLES**



Sizes 9", 12", 15", 18", 21" & 25".

Ask your dealer or write us for  
eight page catalog.

**TROYKE MFG. CO.**  
4422 Appleton St., Cincinnati 9, O.

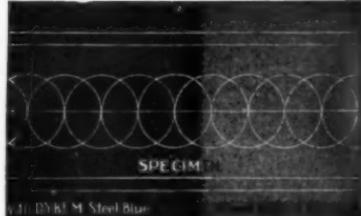
**New Britain  
UNIVERSAL VISE  
THE ORIGINAL**

Swivels 360 degrees horizontally,  
100 degrees vertically, to  
give any angle or com-  
pound of angles.



*Write for  
Further  
Information.*

**NEW BRITAIN TOOL & MFG. CO.  
NEW BRITAIN, CONN., U. S. A.**



*DAI DYKEM Steel Blue*

**DYKEM STEEL BLUE  
STOPS LOSSES  
making dies & templates**

Simply brush on, right at the bench; ready  
for the layout in a few minutes. The dark  
blue background makes the scribed lay-  
out lines show up in sharp relief, and at the  
same time prevents metal glare. Increases  
efficiency and accuracy.

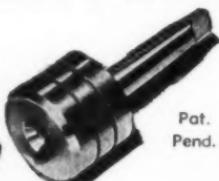
*Write for full information.*

**THE DYKEM COMPANY**  
2301G N. 11th St., St. Louis, Mo.  
(In Canada: 444 Pacific Ave., Toronto, Ont.)

# Empire LIVE CENTER

**With Interchangeable Points**  
ACCURATE • VERSATILE • HEAVY DUTY

THE TAPERED  
SEAT ASSURES  
ACCURACY OF  
± .0001



Pat.  
Pend.



Empire Toolmaker's  
Set available in  
wooden case—  
each tool in  
its own re-  
cess

## Points for Various Operations

- A. Very large, for pipe or tubing work
- B. Extra long point used in facing operations
- C. Extra wide point for large diameter work
- D. Standard point
- E. Blank made of soft tool steel for nests
- F. Female for work not having centers

Send for Literature



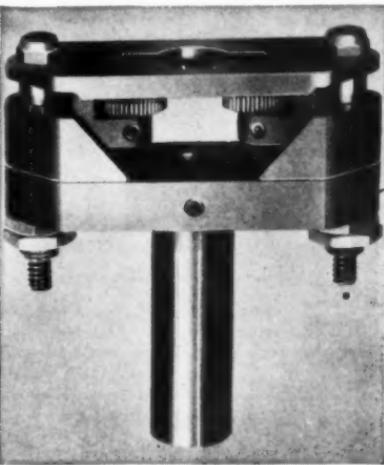
Mfd. in all tapers,  
straight shanks,  
and specials.



70 SPRING STREET • NEW YORK 12, N. Y.

## BARNABY KNURLING TOOLS

A new type of knurling tool for use on both automatic and hand screw machines is announced. These turret tools permit high-speed precision knurling behind shoulders or at any distance from end of work, without using back rests. During advance and withdrawal, the knurls clear the maximum stock diameter of the machine.



These tools are operated by any lead cam, or by manual turret feed on hand screw machines. Advance of tool is stopped wherever desired when its two adjustable operating studs meet spindle nose guard of machine. As turret advance continues, the two knurls—carried by spring-loaded sliding steel wedges—are forced radially into opposite sides of the work, simultaneously and to equal depths. When turret is backed off, knurls separate fully and automatically to permit free and rapid withdrawal.

These tools permit extra-fast set-up. They do not require special camming or synchronization of lead and cross slide cams, but operate directly off any pick-up cam—and because of their balanced design, which eliminates all transverse thrust, no back rest set-up is required.

Full information in an illustrated bulletin is available on request from Barnaby Mfg. & Tool Co., 70 Knowlton St., Bridgeport 8, Conn.

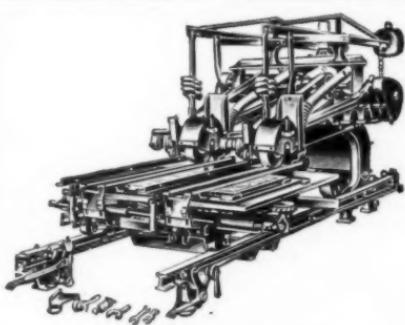
DRILL JIG  
**BUSHINGS**

A.S.A. STANDARD types and sizes in stock for immediate delivery.

Excellent delivery on NEW GAGES and GAGES salvaged by HARD CHROMIUM PLATING.

Write today for particulars

**ECONOMY TOOL & MACHINE CO.**  
MILWAUKEE 14, WISCONSIN



EXCELSIOR No. 27  
**AUTOMATIC**  
GRINDING and POLISHING  
**MACHINE**

EXCELSIOR TOOL & MACHINE CO., EAST ST. LOUIS, ILLINOIS

HERE IS A  
*Machine*  
FOR  
GRINDING and POLISHING  
*Stove Tops*  
*Auto Bumpers*  
*Electric Irons*  
*Stainless Steel*  
*Sheets*  
AND  
*Other Products*

*Split thousandth*  
**ACCURACY**  
 on locating problems  
 with OPTICS

Whenever you bore, turn or mill to layouts, set up your job with OPTI-LOCATOR, the modern, time-saving optical tool that assures split-thousandth results before the job is commenced.

Sight OPTI-LOCATOR from a convenient position—no squinting—no eye-pieces. Use OPTI-LOCATOR on lathes, vertical and horizontal mills, jig borers, drill presses, etc. Rejects source of errors before they occur... actually corrects for spindle runout in worn machines.

Small, simple, compact—nothing to wear out or get out of order. Assures jig-boring accuracy for

only  
**\$24.50 complete!**

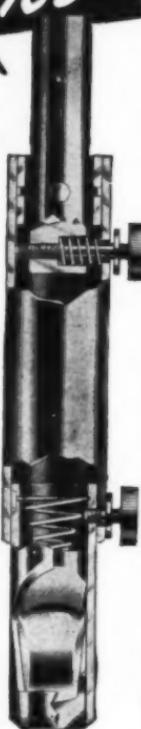
Order through any authorized distributor or write direct.



**FREE BULLETIN!**  
 Describes OPTI-LOCATOR, accessories and applications. Send for free copy today!

**THE BENTON COMPANY**  
 DEPT. B.

351 S. LA BREA AVE., LOS ANGELES 36, CALIF.



## Want Quick Delivery?

Mercury Airfreight Corp. has announced a second morning door-to-door air freight delivery on shipments between New York and Los Angeles at rates competitive with surface express.

W. L. Thompson, vice president of the newly formed corporation said that shipments are now being flown at rates as low as 11 cents a ton mile.

The company, whose headquarters are at Los Angeles, is making extensive plans for regional and national expansion, he said.

Officers of the new firm are Frederic M. Blow, president of the Mexican freight and passenger airline, Red Aerea Mexicana, S. A., and a director in Aero Industries, president; W. W. Goldsborough, president of Midland Aircraft Co., Wichita, secretary-treasurer, and Thomas Morris of Los Angeles, general counsel.

Nile O. Greer, a former industrial traffic manager and freight forwarder, is in charge of traffic.

Fred E. Hugill has been appointed regional manager in Chicago, and Geo. S. Dart, regional manager in New York.

## PLASTIC COATINGS

The Watson-Standard Co., Pittsburgh, has expanded its Vyncote Division in order to meet increasing demands. The division now has independent technical and production personnel.

Wartime research has led to the development of vinyl plastics for application to metal products including aluminum and magnesium. These form a flexible surface film, said to retain all the properties of solid plastics, resisting water, grease, oil, chemicals, heat, etc.; and adaptable to any baking cycle whether it is one of seconds or hours.

## INDEX BY SEAMEX

A new type index has been made available by the Seamex Co., Inc., 41-23 24th St., Long Island City 1, N. Y. On the left is a table which presents the problem to be solved, indicating certain ranges of pressures, temperatures, etc. To the right is the number of the page or bulletin on which the required type of hose and couplings are illustrated. The reverse side of the sheet contains a graphic tabulation showing the standard metals in which hose and couplings can be furnished from stock or made to order.

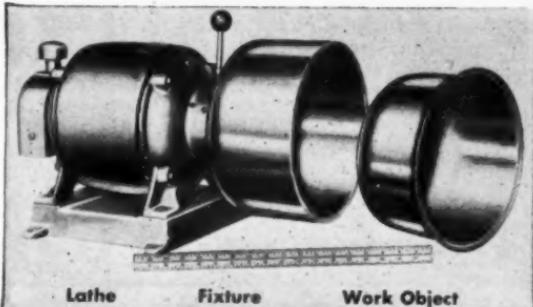
## VACUUM GRIP LATHE

A new model heavy duty, vacuum grip speed lathe, introducing a built-in wet vacuum pump which holds work pieces without chucks or collets, is announced by Crozier Machine Tool Co., 654 No. Prairie Ave., Hawthorne, Calif.

Without use of piping or glands, the patented built-in pump generates its own vacuum that holds the work securely when lathe is in motion, releasing the work instantly when machine is stopped. Starting and instant stopping of spindle are accomplished thru an ingenious mechanical brake and switch — also patented — controlled by a single lever.

The vacuum seal is created by drawing oil from a large reservoir into the pump early in the vacuum cycle. Oil is separated from exhaust air on discharge cycle and being recirculated requires only occasional replenishment.

Adaptable to both small or large work



Lathe

Fixture

Work Object

pieces, the Vacuum Grip Lathe holds metal, plastic, rubber, wood or glass. A few of its many uses include lens grinding, utensil polishing, utensil sunraying, disc valve grinding, trimming rubber products, removing flash from plastic products, machining copper discs, etc.

Motors are 2 or 3 phase, 220, 440 or 550 volts, 50 or 60 cycles, 1800 or 3600, 1800/-3600, 1800/900 or 1200/600 rpm. Threaded spindle is 1"-8x1". Direct current or single phase a-c operated lathes are not supplied.

# WILLEY'S

GENERAL PURPOSE  
TUNGSTEN CARBIDE TOOLS

• Standard tools carried in stock for immediate delivery. Special tools built to your specifications.

Catalog gives full information on standard tools and blanks, as well as special tools, gages, centers, centerless grinder rests, diamond tools and other special articles.

**NOW!  
By the Box**

Get Willey's Standard Tools by the box.  
Handy

**Write for  
CATALOG 28**

## WILLEY'S CARBIDE TOOL CO.

SOLE MAKERS OF WILLEY'S METAL

1342 W. Vernor Highway Detroit 1, Michigan

## PERFECT TAPPING EVERY TIME

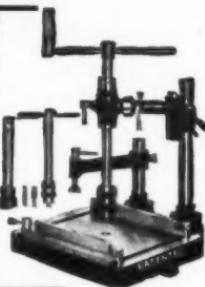
End spoilage and rejects thru poor tapping,—tap every hole perfectly at exact angles (0° to 90°). You can always be sure of a perfect tapping job with the

### ALLMAN Precision TAPPER

Standard equipment in every modern metal shop. Reduces tap breakage—even in the hands of an apprentice. Universal in its application. Pays for itself in a couple of months. Write today for illustrated circular.

**WOLCO TOOL DIVISION**

**725 Custer  
Evanston, Ill.**



## Water Treatment Produces Distilled Water

Operation of a recently completed porcelain enameling plant at Connersville, Ind., will begin late this month, the American Central Manufacturing Corp. announced yesterday. Important features of the plant, which cost \$750,000, are a water treatment installation which produces nearly perfect distilled water to mix with the enamel, and air-conditioned spray booths, the announcement said. Engaged in war years on production of jeep bodies, the company is now manufacturing all-steel kitchen units.

## High Tensile—Replaces Hot Rolled Steel

Use of high tensile steel in place of hot rolled steel has enabled Monroe Auto Equipment Co. to produce standardized material-handling equipment, platform skids, nestling rings, steel pallets and the like, which weigh 40 per cent less than similar prewar equipment, the company announced yesterday.

New devices have been tested by use in the company's plant for several months are now available for immediate shipment, the announcement said. Advantages of lighter weight are a correspondingly greater payload, lower cost and lower shipping charges, it was explained.

Sizes of the various units have been standardized to enable mass production. In addition, standardized sizes allow maximum shipments in trucks, trailers, or freight cars, the company continued.

Monroe entered the material-handling field 18 months ago when it purchased the business of the Stoner-Maurer Co.

## VARI-SPEED LATHE

Printed matter is now available on the new Precise Vari-Speed Lathe. The Vari-Speed bulletin gives full details on the specifications and features of this tool unit, which is especially designed for such things as the polishing of small screw machine parts, costume and novelty jewelry, small metal and plastic parts, and fittings. It is of good general use for grinding, sharpening, and finishing. For this bulletin write to the Precise Products Co., 1331 Clark St., Racine, Wis.



## Grobet TUBE DEBURRING FILES

From 3/16" to 2 1/4" O.D. in 16 sizes. High speed steel ground from the solid after hardening. Makes 45 chamfer outside, 30 inside. Adjustable to increase or decrease relative chamfer between inside and outside wall of tubing. Speed ranges from 50 to 250 r.p.m. according to size. Also sold in sets in special wooden box. Write for technical details. Order from your favorite supply house.

**GROBET FILE CO. OF AMERICA**

421 CANAL STREET

NEW YORK 13, N.Y.

## ARTUS ARBOR SPACERS

The COLOR tells  
the THICKNESS

ARTUS  
ARBOR  
SPACERS  
U. S. PAT.

ARTUS Arbor Spacers made of plastic in various colors identify thickness at a glance! .001, .0015, .002, .003, .005, .0075, .010-.030. Speed up accurate fitting at low cost. Write for folder.

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10 ea. .001 — .0125 thick  
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#### 100 SPACERS IN ALL

$\frac{7}{8}$ " — \$2.80    $1\frac{1}{4}$ " — \$3.40  
1" — 3.00    $1\frac{1}{2}$ " — 4.20

Other standard sizes also available.

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Precision type  
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AUTOMATIC  
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## CUTTERS

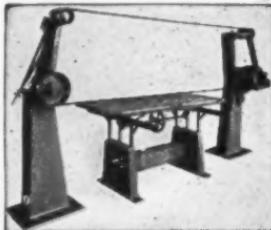


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RODS      FLAT BARS      ANGLES  
WIRE ROPE

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Write TODAY for information also on tailstock and tool post turrets, plain dividing heads, swing-frame grinders and foundry riddles.

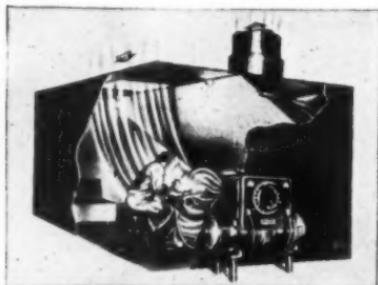
## JEFFERSON MACHINE TOOL CO.

700 WEST 4TH ST., CINCINNATI 3, OHIO

FINISH  
WOOD  
AND  
METAL  
FASTER

## PRODUCTION WELDING BOOTH

Protection of health and provision of more pleasant working conditions for production welders, is the purpose of this



new fresh air, safety welding booth being planned for future production by The Hobart Brothers Company, Troy, Ohio.

The booth will be 9 1/2 ft. wide, 9 1/4 ft. deep and 7 ft. high, constructed of fabricated panels of 16 gauge sheet steel formed with companion flanges, punched on 12 inch center for bolting assembly.

This type construction makes it easy to disassemble the unit to move to another location if desired. The door will be of the sliding type, with overhead track and easy running rollers. It will measure 43" wide by 78" high.

A heavy duty exhaust fan will draw in fresh air through an opening in the top, down past the operator, picking up welding fumes and heat, and expelling them outside the building. This booth will not only provide fresh air and comfort for welding operator, but it will protect fellow workers from eyeburn and welding fumes.

## ACCUMULATORS

A bulletin has been prepared presenting accumulators for industry. It is published by Greer Hydraulics, Inc., 454 18th St., Brooklyn, N. Y. Included are such important items as performance charts to aid in the determination of the accumulator needed to meet any system requirement, construction data, principles of operation, etc. Diagrammatic sketches show typical installations using hydraulic accumulators.

Pictures are shown of several Greer testing machines used for all aircraft systems. These machines include both stationary and portable types.

## AT LAST! A PERFECT LIVE CENTER



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**\$6.90**

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With added features galore at no added cost to you.

MORROW ENGINEERING CO., 1132 E. Firestone Blvd., Los Angeles 1, Calif.



# DIAMOND ACME TOOLS

Diamonds vary in quality and it is important to use the proper kind for a given job. "Bargain diamonds" are not an economy.

If you don't know diamonds know your diamond dealer. Our 45 years in this field merits your confidence.



**ACME DIAMOND TOOL CO.**  
15 MAIDEN LANE, NEW YORK, N. Y.

## Level in a Jiffy!

4 sizes: 2 3/4", 3 3/4, 5 1/4" and 7 1/2" closed heights. Self-leveling ball and socket cap.



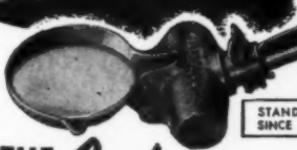
Simplex Machinists' Jacks cut costs by speeding leveling of work on planers, milling machines, etc. Side lock holds screw at desired height. No. 3A Spreader Jack is invaluable for work in close quarters. Ask your dealer.

Templeton, Kenly & Co.  
Chicago 44, Ill.  
Better, Safer Jacks Since 1899

**Simplex**  
LEVER SCREW HYDRAULIC  
**Jacks**

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*Make them yourself!*



STANDARD  
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## THE Johnson WAY!

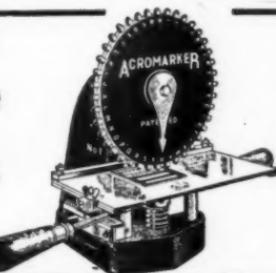
Hammers now made from a special alloy that greatly prolongs their LIFE — Heads that will not jar off; once shapeless, can be quickly remelted, run onto duplicate handles.

Mold EASY to operate — ask for descriptive circular — write Dept. M-2

**LAWRENCE H. COOK, Inc.**  
Successors to The Johnson Tool Co.  
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NUMBERING AND  
LETTERING OF  
MACHINE PARTS  
AND  
NAME-PLATES



## ALSO—

WRITE FOR LATEST BOOKLET ILLUSTRATING "100 METHODS AND MACHINES FOR MARKING."

**ACROMARK**  
ELIZABETH, N. J.  
15 MORRELL ST.

## Industry's New Nonprofit Precision Laboratory

A new service to industry was inaugurated recently with dedication of the Ohmite Laboratory of Precision Electrical Measurements by the Armour Research Foundation of the Illinois Institute of Technology.

Purpose of the new laboratory is to make available to small manufacturers accurate measurements and calibrations which are now performed by the Bureau of Standards. It will be operated on a nonprofit basis and save the manufacturer the time and expense involved in sending this work to Washington.

Although not as precise as the Bureau of Standards' equipment, it is sufficiently accurate for practical industrial purposes. In addition, the manufacturers in the Chicago area will have the benefit of convenient and expeditious consultation service with the laboratory staff.

### D. T. Siegel Backs Project

Conceived by Dr. J. E. Hobson, director of the Armour Research Foundation, the laboratory was made possible through the contributions of David T. Siegel, president of the Ohmite Manufacturing Co., Chicago producer of electrical equipment.

### DIE-LESS DUPLICATING

A booklet which summarizes the developments made in "Die-Less Duplicating" during the war is now available upon request from the O'Neil-Irwin Mfg. Co., 314 8th Ave. So., Minneapolis 15, Minn. This new edition is the Di-Acro catalog No. 46-10.

Many uses of these machines are shown for peace time development of production. Included are brakes, shears, and benders. The construction, applications, and many examples of its work are illustrated. Some uses shown are rather unique, such as the simultaneous use of two machines for dual forming.

This catalog should prove of particular use in model shops, experimental laboratories, machine tool, automotive, and general manufacturing fields.



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ON CARBIDE-TIPPED  
HIGH PRODUCTION TOOLS

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A COMPLETE listing of our standard design tools which meet 90% of the requirements for all hole finishing. Reamers — spot facers — form tools — combination tools and specials.

**SCHMARJE** TOOL AND ENGINEERING CO.  
MUSCATINE, IOWA

## DRILL PRESS GUARDS

By R. Gibbs, Westinghouse Electric Corp., East Springfield, Mass.

Adequate safety precautions require that a drill press operator be protected from flying chips during the machining operation. Common practice has been to



supply the operator with goggles or a head shield, but constant supervision often is necessary to force him to wear such devices. Consequently, the plastic guard shown in Fig. 1 has been adopted. Mounted on the spindle stops of the drill press, they insure complete protection at all times and have the enthusiastic support of the operators.

## 1 MM STEEL BALLS

Philadelphia, July 12—Production of high-precision steel balls half the size of a pinhead and four times more valuable than gold was announced by SKF Industries, Inc. Designed for new-type fountain pens, they also will be available for delicate instrument bearings and other applications. The balls are so tiny that 7,000 weigh only an ounce.

The balls are made from high carbon and chromium wire 45/1,000th of an inch thick which is fed into machines that cold-press ball blanks at the rate of 18,000 an hour. Grinding operations before and after heat-treating and tempering "peel" from 4/1,000th to 8/1,000th of an inch at a time from the balls until they are reduced to the final size of 39/1,000th of an inch. Nine distinct operations and about 190 machine hours are required to process a batch of a half-million balls.

## "MODERN" VISES...

are precision-built with hardened and ground jaws for rapid production work on milling machines, shapers and drill presses.

### CAM VISES...

Jaw dimensions: width 4" or 5", depth 1½", maximum opening 2" or 3".

### SWIVEL VISES...

4", 5", 6".

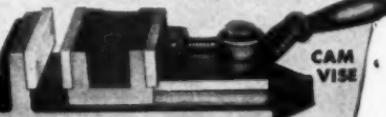
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MANUFACTURERS OF PRECISION  
HIGH SPEED STEEL  
AND CARBIDE CUTTING TOOLS.

## MODERN TOOLS

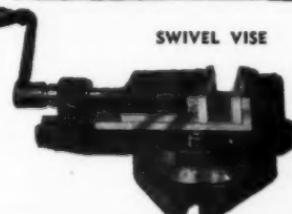
BERLIN, CONN.

Manufacturers of precision high speed  
steel and carbide cutting tools.



## "MODERN" VISES

SWIVEL VISE



## VACUUM AND PRESSURE

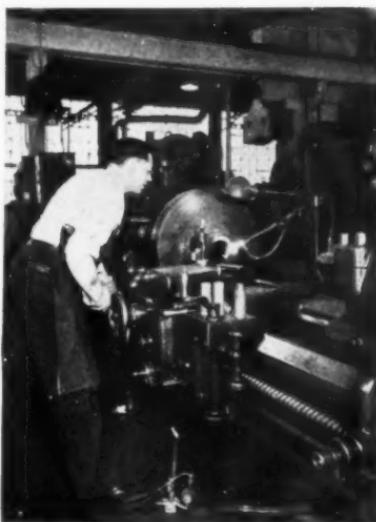
Several score uses or installations are shown in a new blueprint booklet of vacuum pumps and pressure blowers. A very interesting one is that of the air motor which may be used for up to five hp. at speeds of 1800 rpm or less.

Fuel oil burning as well as hospital surgery, gas generating systems, and steam vacuum units for putting steam into stubborn radiators instantly are also among the interesting layouts shown.

It's free for the asking on your own letterhead, stating the subject in which you may be interested at the moment, with any questions you would like further detailed information about.

Leiman Bros. Inc., 166 N-W-1 Christie St., Newark 5, N. J., are the publishers, and they will be glad to furnish a copy with their compliments if you will mention where you saw this notice.

steel is extremely brittle and difficult to work, it does have certain electrical characteristics that make it invaluable in the design and construction of electrical equipment.



## GAS BURNER ANNEALS SILICON STEEL

By C. CHOQUETTE, Westinghouse Electric Corp., East Springfield, Mass.

A gas burner installed on a slitting machine is reported to have materially eliminated loss due to breakage when slitting silicon sheet steel. While silicon

## IMMEDIATE DELIVERY

### Sight Gravity Feed Oiler

- Can Be Taken Apart To Clean
- Unbreakable "LUCITE" Reservoir
- Unbreakable Sight in Shank

OIL-RITE'S completely unbreakable oiler is reliable and sturdy. Easy to fill . . . easy to watch. Protect your machinery against bearing failure. Capacity  $\frac{7}{8}$  oz. to  $1\frac{1}{2}$  qts.



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### OIL-RITE CORPORATION

3474 South 13th St. Milwaukee 7, Wis.  
Specialists In Industrial Lubricating Equipment.  
Constant Level Oilers — Loose Pulley — Spindle  
Oilers — Oil Cups.

The burner is attached to the front of the slitter and is connected to the shop air and gas lines. Before the steel enters the slitter it is fed over the burner, which is adjusted to heat the metal to the proper working temperature.

### MICRO-KING MILL-DRILLS

The same Micro-King drills will handle all types of metal, plastics, etc. Materials heretofore considered difficult, are easily drilled. Holes can be drilled very close together or even overlapping without tearing the metal or shattering the plastic. No lead holes are required—Micro-Kings are self-centering.

The full story of Micro-Kings is presented in an attractive new bulletin. Several typical jobs are shown of drilling operations on unruly materials.

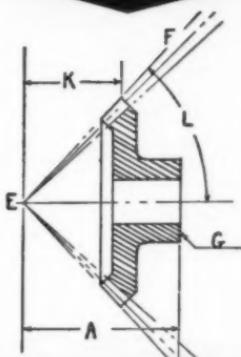
A set of the Micro-Kings in a case is shown—covering the range of  $\frac{1}{8}$ " diameter thru 2" by eights and  $1\frac{1}{16}$ " diameter thru  $1\frac{15}{16}$ " in  $1/16$ "th sizes.

For a copy of the bulletin, address Barco Machine Products Co., 1975 E. 65th St., Cleveland 3, Ohio.

Here's the  
Problem

...and here's the Answer  
EASY BEVEL GEAR GAUGING

No Long Calculations  
No Involved Set-up



With Herkimer sine bars and bevel-gear gauges, anyone with ordinary gauging experience and ability to read blueprints can quickly and accurately check all important bevel gear dimensions and relations. Production gauging made easy.

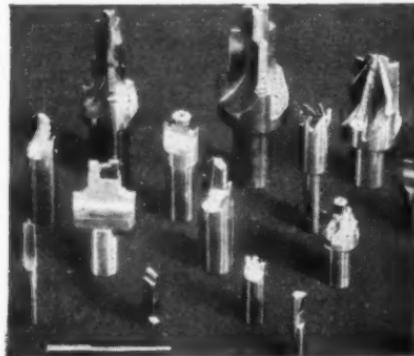
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of Bulletin 100



HERKIMER TOOL & MODEL WORKS, 108 King St., Herkimer, N.Y.

## FORM-GRINDING

.. is our business!



• Your own products are *your* specialty. Why not let us form-grind the illustrated types of form flat-drills in which we specialize?

Our entire organization is keenly interested in "Form-Grinding" and its problems. Facilities include J. & S. "Form-Dressers," J. & S. "Form-Grinders," and all necessary form-grinding equipment. The "know-how" developed by supplying some of the outstanding manufacturers in industry, is available for your quality tool requirements—and at competitive prices. Your requests for quotation are solicited on that basis.

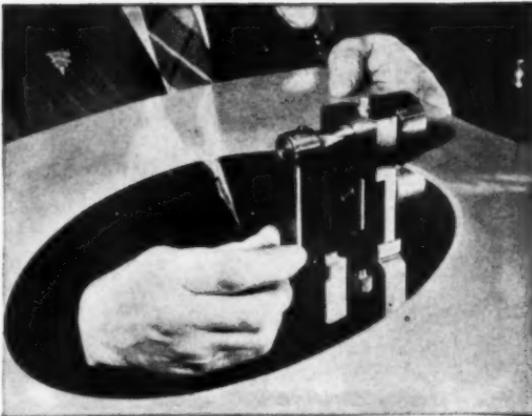
Write for booklet or send prints today!

*J & S*

TOOL CO. 477 Main St., East Orange 2, N.J.  
Manufacturers of "Fluidmotion" Radii and Angle Dressers

**TURNING ROLLS FOR WELDING**—Here is an illustration of self-propelled turning rolls mounted on tracks. By this arrangement the work can be positioned under the automatic head for all welding operations. The weight capacity is 25 tons, and allows for circumferences of from two to 12 ft. The equipment is operated by remote control. It is one of the latest productions of the Ransome Machinery Co., Dunellen, N. J. (Photo — Courtesy Struthers Wells Corp., Warren, Pa.)

Shown in operation is a new tool developed for crimping sheet metal up to 16-gauge, on the job or after installation, by Frank Lucarelli, Tool Designer at The Glenn L. Martin Co., Baltimore, Md. The tool is applicable to any job where crimping is required.



#### BULLETIN ON CAMOGRAPH

The Air Reduction Sales Co., New York City 17, offers a new bulletin describing its Airco Camographs, Nos. 4 and 5 oxy-acetylene cutting machines.

The bulletin covers specifications, operating instructions and electrical requirements. The Camograph bulletin is complete with illustrations of both machines and has color diagrams of their respective cutting ranges.

## ENGINEERS — PRODUCTION — INSPECTION MEN! BOOST PRODUCTION AND PRODUCT QUALITY — 15 DAY SHIPMENT ON URGENT ORDERS

CURTISS-WRIGHT CORPORATION RANKS OUR PRODUCT WITH THEIR BEST TOOLS. CLEVELAND GRAPHITE BRONZE COMPANY, LEADING BEARING MANUFACTURER, STATES NEW HIGH ACCURACY REACHED, PLUS SUBSTANTIAL PRODUCTION BOOSTS.



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NO MORE "C" WASHERS, WRENCHES, DRAWBARS, NO MORE ARCS OR TAPERS BEFORE OR AFTER EXPANSION GRIP — CONCENTRICITY IN LOW 10,000ths — PRODUCTION OR INSPECTION.

Assured parallelism of sleeve surface to center line — absolutely no variation in repeated mounting of parts — No tapers. Uniform full-work-length friction-locking gives complete control and contact of entire bore surface area. Slip part on mandrel with slight counter-clockwise motion, that's all — it's ready — Self-contained, self-expansion, self-locking, self-contraction. Instant unloading, no jamming, no adjusting — Interchangeable sleeves — you do not obsolete Young Mandrels. — Built to your bore tolerance high limit, with automatic contraction to low limit — Any mounting — Any machine operation — For bore diameters .718 to 5.5 — Reduces tool costs, extra equipment investment, operating costs, maintenance, down time, scrap, salvage.

YOUNG ARBOR COMPANY, 3257 Bradford Rd., Cleveland Heights 18, Ohio

# MANEUVERABLE



# ... DEPENDABLE

Rugged, dependable and maneuverable, the Marschke "In-Between" Grinder gives efficient performance with minimum effort . . . and at minimum cost.

Its maneuverability permits it to get to the work in an efficient manner. The combination of balance and swivel collar suspension results in less operating fatigue. All of the operator's effort goes to guiding and

pressing the wheel against the surplus metal areas . . . with no wasted lifting effort.

The Marschke "In-Between" Grinder is far more powerful—more productive—than portable hand tools. Maximum cutting efficiency is obtained from the 12" x 2" wheel driven by a 3 HP motor.

Write for further details today.

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**PROMPT DELIVERY ON  
THIS EFFICIENT SQUARING SHEAR**

A newly designed Foot Power Squaring Shear embodying many new improvements not found on similar machines. Built in one size, 36" to shear 16 gauge soft steel and lighter.

All steel welded construction, unbreakable. All parts of ample size, strongly braced to cut up to full capacity without springing.

Adjustable front and rear gauges are provided. Machine is also furnished with spring actuated hold-down.

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Economy Tool & Gauge Company



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1/5 H.P. - 40,000 R.P.M.

USE IT FOR FASTER, SMOOTHER WORK  
ON STEEL, IRON, BRASS, BRONZE, WOOD,  
PLASTICS, GLASS AND OTHER MATERIALS.



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ENGRAVES  
POLISHES  
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Speed with power with precision—that's the new PRECISE 40. Surpasses our own PRECISE 35 which outworked every tool in the field. In strong, light plastic case, PRECISE 40 weighs only 40 oz.—packs a record 1/5 H.P. New type quill mounts precision collet chuck or grinding wheel arbors of various sizes; push-button spindle lock for quick tool change, 90% greater cooling; four oversize ball bearings. Quickly lubricated by pressure gun through ball-valve inlets. Tool mounts in vise, lathe, stand, or milling machine or can be used with PRECISE accessories for special applications. Guaranteed shockproof without ground wire.

Send for this 6-page Bulletin  
**PRECISE PRODUCTS COMPANY**  
1331 CLARK ST., RACINE, WISCONSIN

## PRECISE 40

### FIRE PROTECTION

Fire protection authorities constantly urge proper maintenance and annual inspection of fire extinguishers to assure satisfactory operation in emergencies. The usual annual inspection may, however, be inadequate for the "EAS" devices (extinguishers approved by the Underwriter's and Factory Mutual Laboratories under Emergency Alternate Specifications) produced during the war, when lack of critical materials made necessary the use of substitutes.

A comparison between some of the materials used in the standard units and those in their substandard counterparts

EAS extinguishers

will make clear why it is essential to be on guard against deterioration. The shell of all 2½ gallon pressure units bearing EAS approval was made of steel instead of the copper which is used for the shell of the standard extinguishers. This was true also of one-gallon pressure type vaporizing liquid units. Steel is, of course, far more subject to corrosion than copper.

The inner cylinder of foam extinguishers, normally of tinned copper, was made of steel coated with porcelain enamel which was also used in place of brass in the construction of the pump in EAS pump tanks. Subject to cracking, porcelain enamel parts require frequent and careful inspection.

Pump packings, gaskets, and similar parts ordinarily made of natural rubber were made of synthetic rubber. Hose of all was made of reclaimed rubber. Loss of flexibility, with consequent cracking, must therefore be anticipated. Unimportant to the proper functioning of an extinguisher but vital to its identification is the name plate. This was decalcomania on the EAS units, rather than the metal name plate which is soldered or welded to the shell of standard units. No satisfactory method for permanent application of the decals was ever found. It is therefore necessary to make sure the name plate has not peeled off or that the extinguisher type is identified by some other means.

## USE

# Fluid-Motion for Modern form-dressing

### ONE SETTING HANDLE CONTINUOUS MOTION

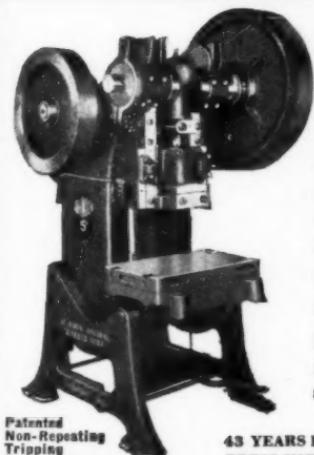
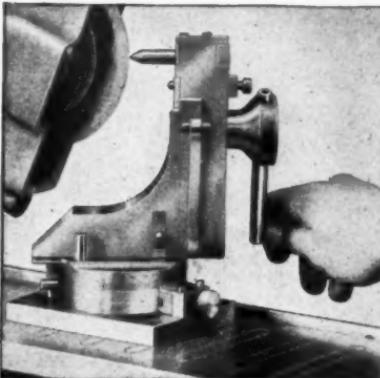
J & S Radii & Angle Dressers in the "Fluid-Motion" series are among the finest precision dressing instruments procurable . . . regardless of cost. There is a standard model to fit most form-dressing requirements.

#### Features

- Fluid-motion dressing
- .0001" accuracy
- Automatic centering
- 7" & 14" wheel capacities
- Large range yet compact
- Chatterless and dustproof

Write for catalog

**J. & S. TOOL CO.**  
477 MAIN ST. E. ORANGE 2, N. J.



Patented  
Non-Repeating  
Tripping  
Mechanism

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Much larger die space than average presses. Engineered and designed for unlimited peak production.

Reinforced construction at points of greatest wear.

If you want the best, send for illustrated catalog describing complete line TODAY.



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**JOHNSON MACHINE AND PRESS CORP.,**

ELKHART,  
INDIANA



This full type roller bearing has many advantages over plain bushings and standard anti-friction bearings in cam follower applications. 1—Great load-carrying capacity. 2—Adaptable to higher speeds. 3—Takes intermittent shock loads. 4—Great race and roller contact. 5—Requires little radial space. 6—Effective sealing, retains lubrication, excludes dirt. 7—Made in wide range of sizes.

Write for Bulletin No. CF40-A

**McGILL MANUFACTURING CO., INC.**  
Manufacturers of Ball and Roller Bearings  
VALPARAISO - INDIANA

#### HOPE THEY START OTHERS

Approval of the sale of Thunderbird Auxiliary Field No. 1, Glendale, Ariz., to the American Institute for Foreign Trade has been announced by the War Assets Administration.

The American Institute for Foreign Trade will use the facilities and buildings on the property to give intensive instruction in foreign area studies, business administration and international regulations in order to train and equip veterans and others to represent American business institutions and federal government agencies and departments in foreign countries, particularly Latin America. About 250 students will be trained an-

nually, veterans being given preference in enrollment.

The property is located on a land site of 180 acres, six miles northwest of Glendale, Ariz., and is improved with 25 one-story buildings including eight barracks buildings, administration and hospital building, classroom building, kitchen, mess hall and recreation building. Housing is adequate for 450 individuals.

The American Institute for Foreign Trade was incorporated under the laws of the State of Arizona on April 8, 1946, by Lt. Gen. Barton K. Yount, of Washington, D. C., and Lt. Col. Finlay Peter Dunne, Jr., of Weston, Mass., as president and secretary-treasurer respectively. The institute is said to be the only one of its kind in the country.

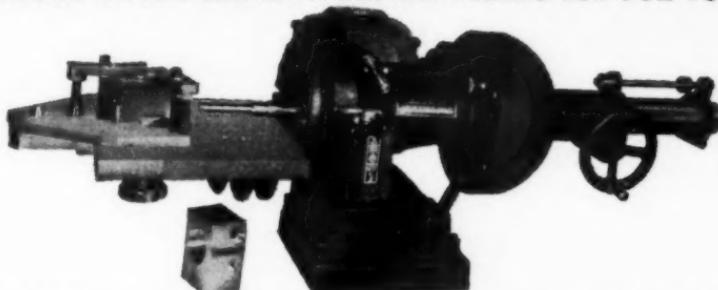
Transfer of the property was recommended by the U. S. Office of Education. Both the State Department and the Department of Commerce take a

favorable view of the creation of such schools in this country.

A Commerce Department spokesman said in part, "The function which it is intended this school will perform will be of inestimable benefit to government agencies and business men in the United States and will result in an increased volume of international trade."

Sale of the property was made under provisions of the Surplus Property Act. This accorded a priority on sales of real property to non-profit educational institutions exempt from taxation under the Internal Revenue Code. Such sales are made at current market value.

## HYDRO-BORER CAN DO A BETTER BORING JOB FOR YOU



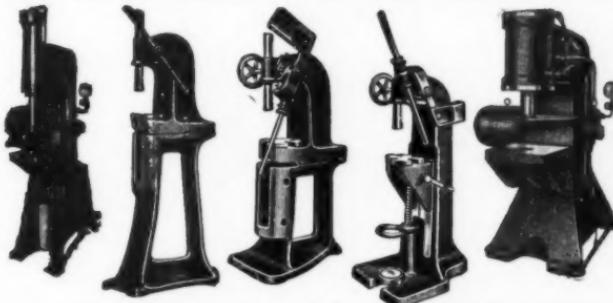
Model C-4F with special fixture for Industrial use. In operation shown, Hydro-Borer is boring and counter boring two holes at  $14^{\circ}$  angle in 14 ST Aluminum. Size of bore .625  $^{+.0005}_{-.0000}$ , length 3-1/4". Special or universal work-holding devices are readily designed and built for mounting on the Hydro-Borer. Many operations possible on these versatile, accurate machines. Eccentric boring head, calibrated, permits advance in bore up to .014 without resetting tool. Bores from  $1/2$ " to 5" diameter by  $5\frac{1}{8}$ " spindle travel. Other models for Automotive and Aircraft application.

Write us for engineering information on your boring problems.

**HYDRO-BORER COMPANY**  
A DIVISION OF SOUTHWESTERN DEVELOPMENT CO.

214 W. Orange Grove Ave. Burbank, California (Los Angeles County)

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## PRECISION WORK IN MANUFACTURING

65 Standard Styles and Sizes. Manually operated presses  $1/4$  to 35 tons pressure.  
Motor driven hydraulic presses  $1\frac{1}{2}$  to 30 tons pressure.

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NEW HAMPSHIRE

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HIGH SPEED



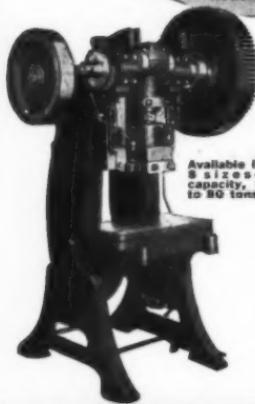
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VERSATILITY



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8 sizes &  
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Factual records show that the advanced Federal Presses are performing an increasing variety of metal-working jobs never before regarded as press operations—producing hundreds of special items which formerly required expensive machinery of limited utility. And Federal Presses are equally famous for precision work—saving time and man-power, reducing costs as well. Write for catalog of complete Federal line.

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This is primarily a silver soldering operation, and while the method described here is the one followed in the plant of the Wall Colmonoy Corp., other methods may be equally satisfactory.

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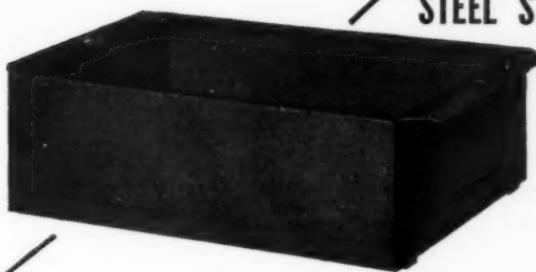
The first step is to flux the conical end of the center shank, and the inside of the tip casting. While the tip is still inverted the silver solder is applied to the

fluxed side of the tip rests on the silver soldered side of the blade.

Both sections are then heated with the torch until the solder flows and bonds to them. At this time the weight of the tip extrudes out any excess solder.

In the case of blades longer than 4", the same procedure is followed, however in regard to the fluxing, and the application of the silver solder. Instead of using an Oxygen-Acetylene torch to run the solder, the blade and tip are placed between two rows of gas burners and heated until the solder melts and the bond is effected.

It is essential that the parts be completely bonded by the silver solder.



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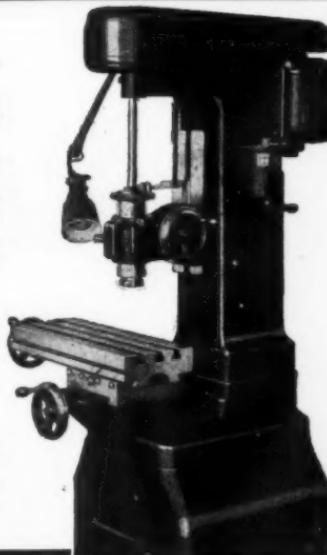
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Conditions vary in all organizations, financial structures, working conditions, and managerial controls, all are peculiar to the individual concern. One item however, that has gradually forced itself on all business consciousness is the matter of human relations, sometimes referred to as public relations.

The first compilation of actual public relations case histories ever published has just been issued by Public Relations News. This 38-page Report shows in detail the new public relations methods and techniques successfully used by twenty-one organizations to build prestige, good-

will and profits.

The Report covers 15 different fields of public relations operations ranging from employee relations to public opinion research; from departmental organization to suggestion systems. It blueprints the Case Histories of such organizations as American Viscose Corp., National Broadcasting Corp., New England Gas Assoc., American Red Cross, The Studebaker Corp., Railway Express Agency, Standard Oil Co. (N. J.), and others.

Titled "Best Public Relations Case Studies," this Report was sent to thousands of subscribers in the fields of big business and small, trade associations, agriculture, education, religion, government, civic and social organizations.

"This new willingness on the part of corporations and their public relations directors to exchange information as to how

they discover and solve their problems is one of the outstanding phases of the development of public relations in the war years—a tendency that continues through reconversion," said Glenn Griswold, editor of Public Relations News in presenting the report.

"The war experience did more to develop techniques and establish standards than the previous twenty-five years of haphazard expansion of this important function. As a result public relations is rapidly moving into the management level. Ability to handle human problems is now a required aptitude in most cases when new executives are chosen."

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### OBTAINING GERMAN INFORMATION

The program of obtaining German scientific and technical information for American business, is rapidly being broadened into a regular international interchange of such information, according to John C. Green, Executive Secretary of the Office of the Publication Board, Department of Commerce.

In its first phase, emphasis will be on exchanging information obtained in enemy countries. Division of Germany into zones of control has meant that each occupying country found only part of the information. Much information on German processes was located outside

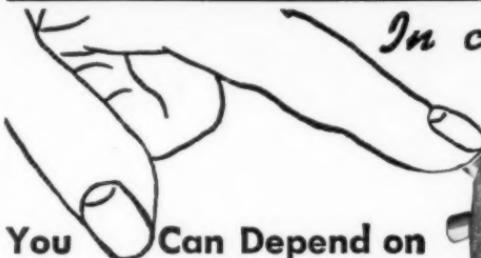
the American zone. Mr. Green said that "Teams of American investigators are at work in the British, Russian, and French zones. These teams are composed principally of American businessmen, organized by OPB. They have already obtained much priceless information, all of which will be made available to all U. S. business. In return, we have welcomed British, Russian, and French teams into the American zone.

"Each country has only part of the picture. No part is wholly useful until it is fitted in with the others. It costs us nothing to share ours with the other countries, and there is enormous value in what we receive in return."

"We are not engaging in formal negotiations with foreign governments," Mr. Green said. "We are simply trading information for information. Our relationships with the British, Russians, and French, in Germany have been friendly and productive.

Progress has been made toward the second phase of the program: a continuing interchange of technical information. Recently, for example, an American team working in the Russian zone was offered a collection of valuable chemical documents originating in the Soviet Union. British authorities have also contributed.

Part of the American contribution is a "Bibliography of Scientific and Industrial Reports," containing abstracts of all reports released by OPB. It is issued weekly by the Superintendent of Documents. This publication, printed as a service to business, is in demand by foreign governments, educational institutions.



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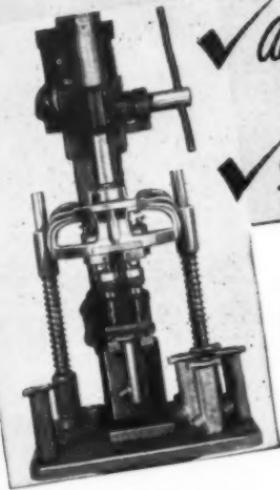
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## COMPRESSED AIR COOLING WHILE ARC WELDING CAST IRON

The reclamation of gray and alloy iron castings with EutecTrode 24 has become a very popular method with many large users of these types of castings. EutecTrode 24 is a flux-coated, metal arc electrode which deposits machinable, color-matching welds on cast iron parts. It is particularly useful on parts where pre-heating is impossible or undesirable.

As is true for any type of welding on cast iron parts, the proper welding procedure must be followed in order to obtain the best results. One of the main requirements for the successful applica-

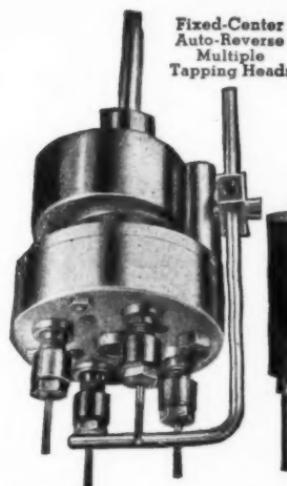
tion of EutecTrode 24 is the running of short beads and continuously allowing the metal to cool to a "hand-hot" condition. For the reclamation of cast iron valves, one large user has developed a new cooling procedure which enables him to cut down his welding time about 25 percent. This procedure utilizes the cooling effect of compressed air. During the welding operation, a jet of compressed air is directed on each short weld immediately after it is run. The cool air is directed slightly ahead and behind the weld deposit. The cool air, however, should be applied a few seconds after color has disappeared, not while the casting is still red hot at the point of welding.

The special coating and alloying metals in EutecTrode 24 will prevent the formation of hard spots or a hard fusion line. Even with the use of cold air, the above user obtained perfectly machinable welds. This, of course, is of prime importance in all cases where the weld deposits must be machined.

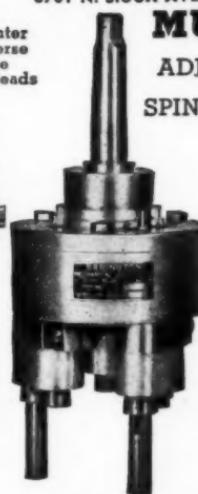
We recommend that manufacturers who have a large amount of reclamation welding on gray and alloy iron castings try EutecTrode 24, together with compressed air as a cooling medium. We are sure they will find that this method will speed up their production considerably.

It is recommended that, before putting a welding operator to work using the air cooling method described here, he become thoroly acquainted with all details of the process. Success depends on doing the job correctly in every respect.

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### SMALL SCREWS IN METAL

Among the many and various aspects of driving small screws in metal, some that are very interesting have reference to doing this job on different kinds of work at the bench. Some screw-driving machines for this purpose are of flexible shaft type. Others are electric, and still others are air-powered. Some are held in the hand and advanced to the work, while in other instances, the screwdriving tool is rigidly mounted, and light pieces of work are advanced to the screwdriver. In all cases, of course, choice of a method depends on which one will drive the most

holding fixture (which is attached to the under side of the benchtop with screws) is provided, to allow for different thicknesses of benchtops, and different types of work being handled.

Setups like those cited have often been adopted because they fatigue an operator much less than in cases where the weight of a screwdriving tool must be handled. However, the problem has been attacked from the opposite end with equal success in some places. For instance, for driving screws in radios, cameras, electrical appliances, etc., various plants are using an air-powered screwdriver.

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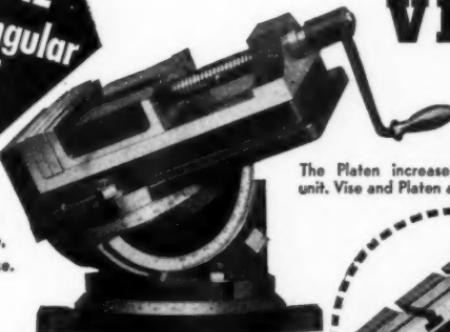
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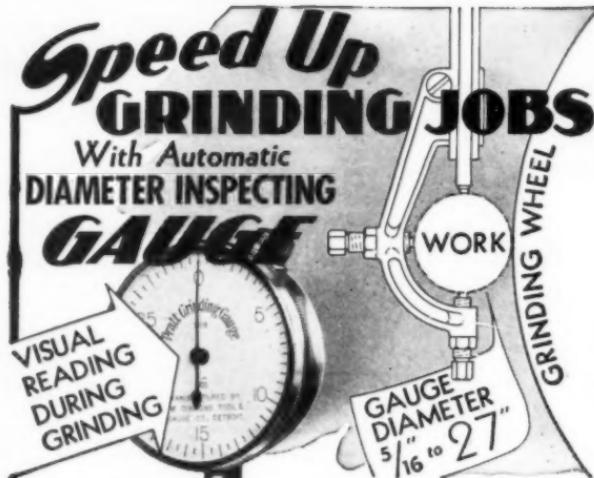
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#### MAGNESIUM FORGINGS

A 30,000-ton forging press for magnesium forgings, probably the largest and most powerful in the world, was built at the I. G. Farbenindustrie plant at Bitterfeld, Germany, in 1944, according to R. T. Wood, investigator for the Technical Industrial Intelligence Branch, Department of Commerce.

Although German peak production of 110 million pounds of magnesium in 1943 fell far short of U. S. peak production of 366 million pounds, several novel processes of interest to the American magnesium industry were developed.

The monstrous forging press was equipped with eight supporting columns and stood 85 feet above the floor line. Eight cylinders distributed the hydraulic pressure evenly. The dies were mounted on a table 32.8 by 19.7 feet.

Another novel development in the German industry was the use of anhydrous ferric chloride to refine the grain of magnesium alloys containing aluminum. Known as the "Elfinal" treatment, the operation was performed at temperatures of 760-780 degrees Centigrade.

The ferric chloride, in powdered form, was packaged in moisture-proof paper, with just enough in each package to treat one crucibleful of metal. The powder was lowered into the metal in a cylindrical steel basket at the end of a long steel sweep. Workers were protected by steel shields. No explosions or accidents were said to have occurred.

In addition to extrusion forging and rolling processes known or used in the United States, the Germans developed a water dip process for making ingots. The process employed a hot thin-wall mold. After removal from the mold, each ingot was sliced for fracture examination and scalped all over. I. G. Farben metallurgists claimed the following advantages for the water dip method: better uniformity of composition, less waste, consistent quality, less dependence on skilled labor, and no limit on the size of the ingot that could be cast. The principal disadvantage was higher cost.

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### SUBSTITUTE FOR ALLOY METALS

Development of processes for production of steels with low sulphur and phosphorus content during the war enabled the Germans to save alloying metals and maintain mechanical specifications, according to a report now on sale by the Office of the Publication Board, Department of Commerce.

Production of bulk steels from highly phosphoric irons was carried out almost entirely in the Thomas converter. The heavy metallurgical load was harnessed as fuel, and a very high rate of production was achieved. The process was used

to make structural, rail, and similar steels.

Low - nitrogen, low - phosphorus steel made in the Thomas converter was used for such products as welding rod and non-aging sheets. The steel was produced by half-blown a normal charge and adding sufficient ore to promote a vigorous boil. In most cases, blowing was then resumed to the end point, which was usually one and one-half minutes short of normal. Steel containing less than 0.10 percent nitrogen was readily obtained by this process.

A new radial rolling mill, capable of taking trepanned ingots up to 120 tons in weight, was installed by the August Thyssen works at Muelheim in 1937. The ingots were centrifugally spun on a vertical axis. The rolling mill turned out tubing up to 18 meters long and 1.8 meters in diameter, with a wall thickness up to 180 millimeters and weighting 100 tons.

An ingenious method to save copper in making iron powder for soft iron driving bands for shells was developed by Krupp's Widia Works, at Essen. It consisted of pouring molten iron of reasonable basic purity either into a water jet impinging on rotating blades, or into a high-pressure jet of mixed steam and air. After drying, the product was charged into heat-resisting steel boxes and heated in a gas-fired furnace. The resulting cakes of nearly pure iron were knocked, crumbled, or milled and then sieved.

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**COLD EXTRUSION OF STEEL**

Discovery of a German method for the cold extrusion of steel shapes may open up an entirely new field in ferrous metal processing, according to a report by W. W. Galbreath, prepared under the auspices of the Technical Industrial Intelligence Branch, Department of Commerce. Though a similar process is used for extruding tin, copper, brass, aluminum, and other nonferrous metals in the United States, it has not been used extensively for steel.

Mr. Galbreath's 341-page report is now on sale by the Office of the Publication

Board, Department of Commerce.

Cold extrusion of steel was developed during the war, largely by the Kabell und Metallwerke Neu-meyer, at Nuernberg, and the Collis Metallwerke, at Westhausen.

In both of these plants, cartridge cases, airplane landing gear cylinders, and fuse bases were extruded from cold steel. Other parts were being produced experimentally toward the end of the war.

With the new process, which requires bonderizing, steel is made to flow under pressure into specially designed dies and molds. Many annealing, pickling, and machining operations are eliminated, and costs are greatly reduced, according to the report. The steel surface, which is phosphate by the Bonder treatment, apparently serves a dual function: (1) as a lubricant, and (2) as a lubricant carrier.

Plans are being formulated by the Army Ordnance Department to import and test the machines which were used in the German cold extrusion process. The results will be announced thru OPB.

In addition to a section on cold extrusion and one on bonderizing, the report contains 17 other sections dealing with the steel stamping and steel sanitary ware industries in Germany. Among these is a study of an extended bronze-lined tubing process, which may be of considerable interest to American industry.

Mr. Galbreath has informed OPB that the present report is in process of extensive revision.

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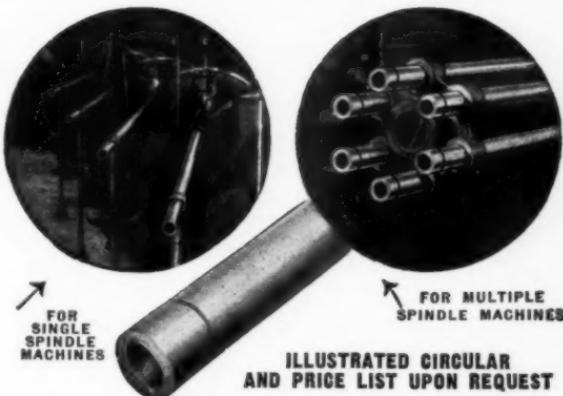
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# Mechanics Through the Ages



**ONE NIGHT**

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IN THE MID-1800'S ENGLISH STEEL WAS UNABLE TO STAND UP TO THE CLIMATE OF INDIA. YET IN THAT SAME COUNTRY CRUSADE SWORDS OF DAMASCUS STEEL MADE 8 CENTURIES EARLIER WERE STILL AS PERFECT AS THE DAY THEY WERE FASHIONED.



**AMONG**

THE EARLY ANCIENTS, STEEL WAS SO RARE THAT IT WAS RESERVED FOR THE CUTTING EDGE OF SWORDS ONLY. THE MORE PLENTIFUL GOLD AND SILVER WERE USED FOR THE BACKS AND HANDLES.

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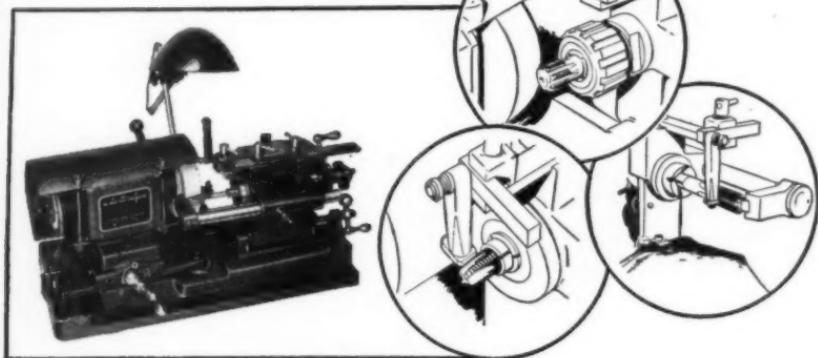
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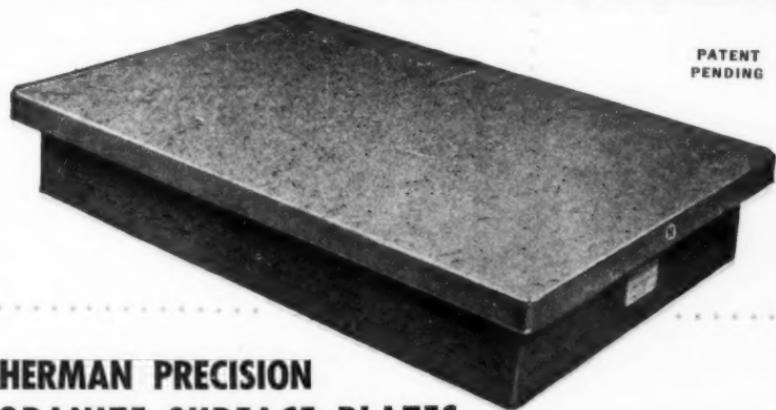
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		Lovjoy Flex. Coupling Co.	54
		Lovjoy Tool Co.	54
		Lucas & Son, J. L.	331
		Luma Electric Equipment Co.	296
Gallmeyer & Livingston Co.	121	McGill Manufacturing Co.	356
Gay-Lee Company	203	Madison-Kipp Corp.	278
General Die & Stamping Co.	372	Madison Mfg. Co.	342
General Eng. & Mfg. Co.	41	Mall Tool Company	86
Gerotor May Corp.	122	Maquoketa Company	30
Gilmant Engineering Works	333	Marshalltown Mfg. Co.	373
Gisholt Machine Co.	11-169	Marvel Tool & Mch. Co.	68
Gits Brothers Mfg. Co.	360	Massasoit Machine Company	326
Gorton Machine Co., Geo.	177	Master Tool Co.	367
Go-to-Neat Company	20	Maveg Inc., Machine Sales Association	259
Graham Mfg. Co.	318-319	Maxon Co.	319
Grant Mfg. & Machine Co.	323	Mod Specialties Co.	98
Gray Mills Corp.	375	Mercury Metal Die Cutter Co.	7
Great Lakes Broach & Gage Co.	78	Meyers Company, W. F.	118
Greaver Machine Tool Co.	330	Michigan Chrome & Chemical Co.	223
Greenfield Tap & Die Corp.	107	Michigan Drill Head Co.	210
Greenlee Bros. & Co.	37	Midwest Tool & Engineering Co.	329
Greenley Manufacturing Co.	212	Miller Knuth Mfg. Co.	210
Grinders & Fixtures, Inc.	201	Minn-Kota Foundry & Mfg. Co.	322
Grob Brothers	302	Modern Machine Tool Co.	62
Grobet File Co. of America	289-290-344	Modern Motor Drives Div. (Nichols Eng. Co.)	178
Gruen Gauge Company	276	Modern Tool Works	181
		Modern Tools	349
Hall Mfg. Co.	332	Moana Ind. Diamond Co.	172
Hamilton Tool Co.	255	Moline Tool Company	370
Hanson Clutch & Mch. Co.	59	Monarch Machine Tool Co.	175
Hardinge Brothers, Inc.	3	Moore Industries, J. C.	283
Harris Foundry & Machine Co.	65	Moore Special Tool Co.	211
Hartford Special Machinery Company	165	Morrell Engineering Co.	346
Hart Mfg. Co., Inc.	166	Motor Tool Mfg. Co.	113
Haskins Corp., R. G.	1	Mummert-Dixon Company	298
Heinmann Mfg. Co.	218	Murphy & Co., James A.	320
Hendley Machine Co.	29		
Herkimer Tool & Model Works	351		
Herman Stone Company	385		
Hesler Mfg. Co.	299		
Hisey-Wolf Machine Co.	70		
Hobart Brothers Co.	1		
Hovis Screwlock Co.	222		
Howe & Son, Inc.	345		
Hydro-Borer Co.	357		
Ideal Industries, Inc.	25	National Acme Co.	117
Independent Pneumatic Tool Co.	63	Neubert Machine Co.	293
Industrial Equipment Co.	281	New Albany Machine Mfg. Co.	174
Industrial Products Suppliers	345	New Britain Machine Co.	35
Ingersoll-Rand	16	New Britain Tool & Mfr. Co.	339
		New Method Steel Stamps, Inc.	337
		New Milford Carbide Tool Co.	273
		Niagara Blower Co.	314
		Nichols Eng. Co. (Modern Motor Drives)	178
		Nichols-Morris Corp.	247
		Nicholson File Co.	171

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Nielsen, Inc.	345	Standard Electrical Tool Co.	95
Nielsen Tool & Die Co.	299	Standard Gage Co.	36
Norgren Co., C. A.	61	Standard Machinery Co.	228
Numberall Stamp & Tool Co.	176	Standard Pressed Steel Co.	72
O. K. Tool Co.	277	Standard Transmission Equipment Co.	184
Oil-Rite Corp.	350	Stark Tool Company	164
Oliver Instrument Co.	51	Starrett Co., L. S.	133
Oliver Machinery Co.	328	Stokerunit Corp.	139
O'Neil-Irwin Manufacturing Co.	237	Strand & Company, N. A.	114
Onsrud Machine Works.	362	Strand Manufacturing Co.	307
Paddock Tool Co.	369	Sturturte Co., P. A.	205
Pellow Machine Tool Co.	335	Sun Oil Co.	74
Persson Mfg. Co.	258	Sundstrand Machine Tool Co.	244
Plunket Machine Co., J. E.	146	Sunnen Products Co.	38
Portage Machine Co.	53	Swedish Gage Co. of America.	327
Potter-Cable Machine Co.	60	Syntron Company	284
Potter & Whitney Mch. Co.	167		
Pratt & Whitney	235		
Precise Products Co.	54		
Procunier Safety Chuck Co.	87		
Production Machine Co.	140		
Producto Machine Co.	90		
Prosser & Son, Thomas.	47		
Pyrometer Instrument Co.	246		
Quality Tool & Die Co.	75	Tamma-Silica Co.	189
Quality Tool Works.	220	Tannowitz Works	229
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Racing Tool and Machine Co.	67	Taylor & Fenn Company	232-236
Reading Machine Co.	256	Taylor Mch. Co.	192
Reid Brothers Co.	225	Templeton, Kenly Co.	347
Riley & Geehr.	170	Thermon Electric Mfg. Co.	312
Rivett Lathe & Grinder, Inc.	2	Thomas Hoist Co.	94
Robbins Eng. Co.	81	Threadwell Tap & Die Co.	149
Rockford Clutch Div.	234	Thor Products Co.	307
Rodgers Hydraulic, Inc.	294	Torit Manufacturing Co.	209
Rogers Mch. Works.	93	Trico Fuse Mfg. Co.	210
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Ross & Co., H. B.	288	Troye Mfg. Co.	339
Royal Oak Tool & Machine Co.	17	Tungsten Electric Corp.	115
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S & S Machine Works.	159	Unique Manufacturing Co.	301
Salem Service Machine Tool Co.	145	United Precision Products Co.	48
Sanford Manufacturing Co.	180		
Schauer Machine Co.	224		
Schmarie Tool & Engineering Co.	348		
Schmidt Inc., Geo. T.	297		
Schultz & Anderson Co.	323		
Screw Machine Specialty Co.	144	Wade Instrument Co.	214
Scully-Jones & Co.	18	Waldes Kohinoor, Inc.	27
Sellers & Co., Wm.	147	Walker Co., O. S.	158
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Sheldon Machine Co.	287	Wall Colmonoy Corp.	82
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Simonds Saw & Steel Company.	57	War Assets Administration.	269-270-271-272
Simplot, Gilbert S.	69	Wardwell Mfg. Co.	317
Skinner Chuck Co.	186	Warren City Mfg. Co.	66
Smit & Sons, J. E.	251	Watson Machine Co.	266
Smith Boring Chuck Co.	206	Weller Machine Corp.	230
Sommer & Adams Co.	371	Wells Mfg. Corp.	89
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Spencer Turbine Co.	96	Whalley Co., George.	329
		White Dental Mfg. Co., S. S.	135
		Whitney Metal Tool Co.	329
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		Wilson, K. R.	99
		Wittek Mfg. Co.	92
		Wolco Tool Div.	344
		Woods Engineering Co.	300
		Woodworth Co., N. A.	111
		Wyzanbeck & Staff, Inc.	163
		Zeiss Inc., Carl.	252

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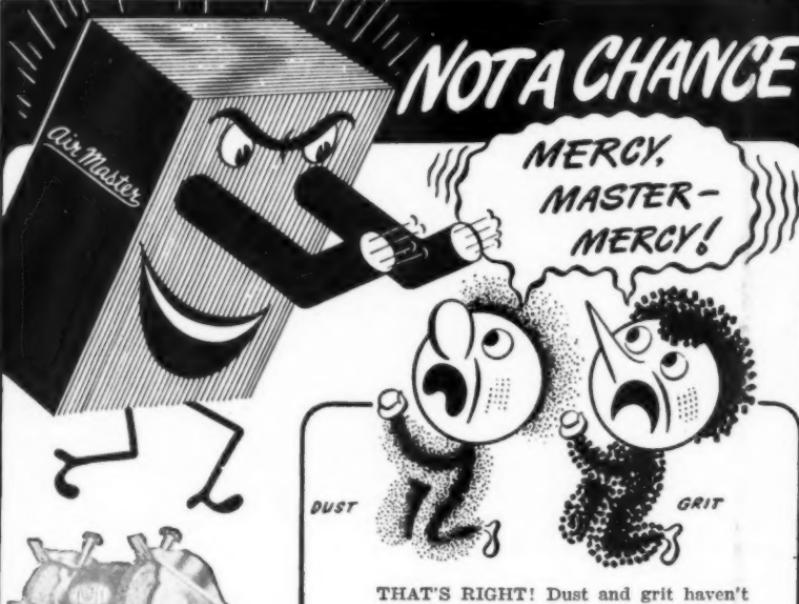
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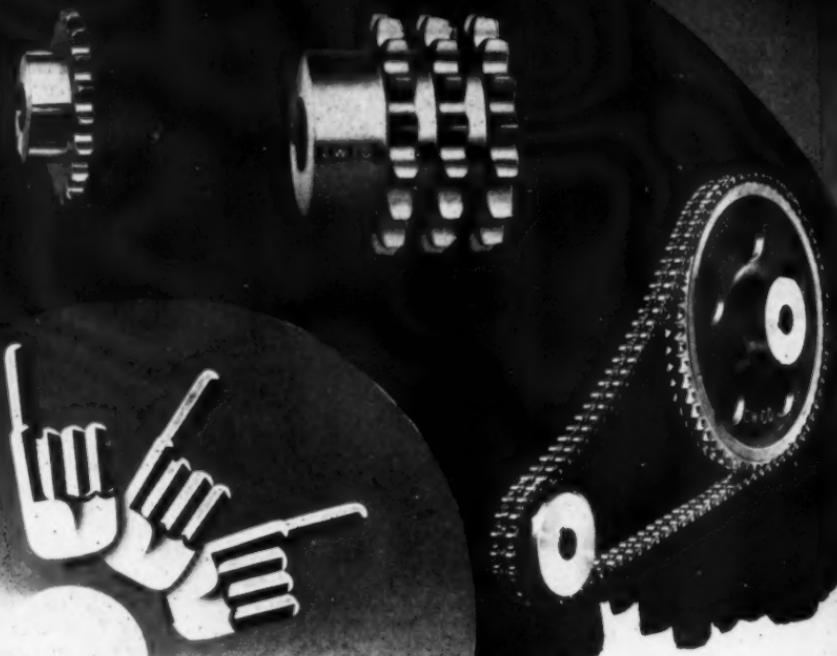
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